LISTEN.
THINK.
SOLVE.®

PowerFlex® 700L

TECHNICAL DATA

LIQUID-COOLED ADJUSTABLE FREQUENCY AC DRIVES

Allen-Bradley • Rockwell Software

Rockwell Automation

Table of Contents

Description . . . . . Page
Product Overview 3
Key Features/Benefits 3
Easy to Use Communication and Human Interface Options. 4
Catalog Number Explanation 6
Standard Drive Product Selection 8
Factory Installed Options 9
User Installed Options 10
Product Dimensions 12
Installation Considerations 14
Cable Recommendations 20
Power Ratings and Branch Circuit Protection. 21
Maximum Motor Cable Lengths 23
DPI Connections 26
Control Connections 29
Control Highlights 32
Standard Drive Specifications 37
Derating Guidelines. 40
Watts Loss (@ Rated Load, Speed, and PWM Carrier Frequency) 40
Cooling Loop Options 41

Reference Materials

For additional PowerFlex 700L data and general drive information, refer to the following publications:

Title	Publication	Available Online at...
PowerFlex 700L Liquid-Cooled Adjustable Frequency AC Drive User Manual	20L-UM001	**www.rockwellautomation.com /literature**
PowerFlex 700L Active Converter Power Module User Manual	PFLEX-UM002	
PowerFlex 700 Adjustable Frequency AC Drive User Manual — Series B (for standard vector control information)	20B-UM002	
PowerFlex 700S High Performance AC Drive — Phase II Control User Manual (for Phase II control information)	20D-UM006	
PowerFlex 70/700 Reference Manual	PFLEX-RM001	
PowerFlex 700L Liquid-to-Liquid Heat Exchanger User Manual	20L-UM002	
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives	DRIVES-IN001	
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001	
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1	

For other information, contact Allen-Bradley Drives Technical Support:

Title	Online at...
Allen-Bradley Drives Technical Support	www.ab.com/support/abdrives

Product Overview

PowerFlex 700L Liquid-Cooled AC drives are responsive, high performance, regenerative industrial drives for installations requiring a compact footprint. The PowerFlex 700L drive offers two versions of control: either the PowerFlex 700 Vector Control or the PowerFlex 700S Phase II Control. This provides the PowerFlex 700L drive with exceptional and proven performance as well as the same interface, communications capabilities and programming tools of the air-cooled drives. The many features allow the user to easily configure the drive for most application needs. Ratings currently available include:

- 268 to 960 Hp (200 to 715 kW) at 400V AC
- 300 to 1150 Hp (224 to 860 kW) at 480V AC
- 465 to 870 Hp (345 to 650 kW) at 600V AC
- 475 to 881 Hp (355 to 657 kW) at 690V AC

Frame 2

Frame 3B shown
(with cabinet doors open)

Key Features/Benefits

Space Saving Features

- The PowerFlex 700L AC drive features a patented liquid-cooled heatsink design to transfer over 80% of the drive heat loss to the liquid coolant, resulting in the best drive power-to-size ratio in the market. The integral active converter and line filter translate to a fully regenerative drive that's over 60% smaller than typical air-cooled units.

Integrated Line Regenerative Braking For Precise Control and Energy Savings

- The Liquid-Cooled AC drive features regenerative braking which is ideal for precise, high-response speed and position control, continuous holdback, rapid deceleration and stopping of high inertia loads. Instead of wasting energy with resistor braking technology, regenerative braking actually puts the energy back into the system to be used by other equipment.
- Regenerative braking eliminates the need for large resistor banks. These resistors banks can create a lot of heat and must frequently be cleaned.

Improved Power Quality with Regenerative Rectifier

- Compact and cost-effective means to achieve compliance with CE and IEEE 519 harmonic limits.
- Actively controls power factor regardless of motor speed which reduces input line currents and minimizes the size of upstream devices.

Input Voltage Boost

- Integrated active converter and line-side filter allow “input voltage boost” protect your system from power disturbances.
- Maintains consistent system performance in the event of power dips or other power quality issues.
- Provides full 480V AC to the motor even when operating on 380V AC power lines.

Flexible Control Platforms

- Designed for applications with requirements ranging from the simplest speed control to the most demanding torque control, the PowerFlex 700L drive is available with either PowerFlex 700 Vector Control or PowerFlex 700S Control.
- Outstanding open or closed loop speed regulation for applications ranging from fans and pumps to precise winder control.
- Excellent torque production and tight torque regulation for demanding applications like extruders, web process and test stands.
- Fast update times of torque inputs are suitable for high performance applications.
- All of this flexibility is possible through multiple control modes: V/Hz control, Sensorless Vector, Vector Control with FORCE™ Technology, and Permanent Magnet Control (700S control only).
- Safe Off Option (1), the first offering available within the DriveGuard™ series of safety solutions, prevents a drive from delivering rotational energy to motors by integrating a safety circuit with the drive's power switching signals. This solution meets EN 954-1, Category 3.

(1) At time of publication, the Safe Off Option is available with the PowerFlex 700S Control Option in Frame 3A and 3B PowerFlex 700L drives.

Packaging Options

- The PowerFlex 700L Frame 2 is an IP00 (Open Style) panel mount drive that can be mounted in a variety of enclosures.
- The PowerFlex 700L Frame 3A and 3B are available in a IP20 (NEMA 1) Rittal enclosure that includes the input circuit breaker.
- The majority of heat lost from the drive is transferred to the liquid coolant. Therefore, other enclosure options such as IP54 (NEMA/UL Type 12) or IP66 (NEMA/UL Type 4X) can be utilized and placed directly into dusty, dirty and outdoor environments. Contact your local Rockwell Automation drive center for these packaging options.

Cooling Loop Options

- The PowerFlex 700L Liquid-to-Liquid Heat Exchanger provides customers a cost effective, standard cooling loop solution for use with the PowerFlex 700L drive. The liquid to liquid heat exchanger utilizes a heat transfer plate to transfer heat from one liquid to another and does require a stable water supply from the user.
- A chiller or liquid to air heat exchanger can also be used with the PowerFlex 700L drive. See page 41 for details.

Easy to Use Communication and Human Interface Options

Premier Integration with PowerFlex Drives and RSLogix 5000

For simplified AC drive start-up and reduced development time, we've integrated Allen-Bradley PowerFlex drive configuration with RSLogix™ 5000 software. This single-software approach simplifies parameter and tag programming while still allowing stand-alone drive software tool use on the factory floor.

Communication Modules

DPI communication modules provide fast and efficient control and/or data exchange over the following interfaces:

- DeviceNet™
- ControlNet™
- EtherNet/IP™
- Remote I/O™
- Serial Communications
- Other open control and communication networks

Unsurpassed Capability in Network Communications

PowerFlex drives are fully compatible with the wide variety of Allen-Bradley DPI™ communication adapters, offering the following benefits:

BACnet®	DeviceNet™	ControlNet™	EtherNet/IP™	Remote I/O	RS485 DF1	PROFIBUS DP	Interbus™	LonWorks™	Modbus RTU	Modbus TCP	Metasys N2	Siemens P1 FLN	Bluetooth®	Description
	✔	✔	✔											**Unconnected Messaging** permits other network devices (e.g. PanelView™) to communicate directly to a drive without routing the communication through the network scanner.
✔	✔	✔	✔		✔				✔				✔	**Adapter Routing** – Plug PC into one drive and talk to all other Allen-Bradley drives on same network, without being routed through the network scanner.
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	Access to 100% of all parameters over the network.
✔	✔		✔			✔								**AutoBaud** capability makes initial connections less problematic.
	✔													**Change of State** significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Very flexible configuration for each node (Example: “reference must change by more than 5%”).
	✔		✔											**Peer Control** provides master-slave type control between drives, where one or more slave drives (consumers) can run based on the status of a master drive (producer), which can also significantly reduce network traffic.
	✔													**Automatic Device Replacement (ADR)** saves significant time and effort when replacing a drive, by allowing the scanner to be configured to automatically detect a new drive and download the required parameter settings.
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	**Flexible Fault Configuration** – Adapters can be programmed to take fault based actions such as ramp to stop, coast-to-stop, and hold last state, as well as send user configurable logic control and speed reference values. In addition, different actions can be taken based on whether the network experienced a serious problem (broken cable, etc.) versus a network idle condition (PLC set to “Program”).

PowerFlex Architecture-Class LCD Human Interface Modules

- An LCD Human Interface Module (also used with the PowerFlex 70, PowerFlex 700, PowerFlex 700S, and PowerFlex 700H) provides multilingual text for startup, metering, programming, and troubleshooting.
- Large and easy to read 7 line x 21 character backlit display
- Alternate function keys for shortcuts to common tasks
- “Calculator-like” number pad for fast and easy data entry (Full Numeric version only)
- Control keys for local start, stop, speed, and direction
- Remote versions for panel mount applications

PC-based Configuration Tools

- DriveExplorer™ and DriveExplorer Lite. Simple and flexible “On-line” tools for monitoring and configuring while connected to a drive.
- DriveTools™ SP. A suite of software tools which provide an intuitive means for programming, troubleshooting, and maintaining Allen-Bradley AC and DC drives.

Catalog Number Explanation

To interpret the meaning of a catalog number, match the values of the catalog number code in positions **a, b, c,** etc. with the tables labeled **a, b, c,** etc. below.

Position	1-3	4	5-7	8	9	10	11	12	13	14	15	16	17	18
	20L	E	800	A	0	E	N	N	A	N	1	0	W	A
	a	b	c	d	e	f	g	h	i	j	k	l	m	n

a

Drive	
Code	**Type**
20L	PowerFlex 700L

b

Voltage Rating		
Code	**Voltage**	**Ph.**
C	400V AC	3
D	480V AC	3
E	600V AC	3
F	690V AC	3

c1

ND Rating				
400V, 60 Hz Input				
Code	**Amps**	**kW**	**Hp**	**Frame**
360	360	200	268	2
650	650	370	500	3A
1K2	1250	715	960	3B

c2

ND Rating				
480V, 60 Hz Input				
Code	**Amps**	**kW**	**Hp**	**Frame**
360	360	224	300	2
650	650	445	600	3A
1K2	1250	860	1150	3B

c3

ND Rating				
600V, 60 Hz Input				
Code	**Amps**	**kW**	**Hp**	**Frame**
425	425	345	465	3A
800	800	650	870	3B

c4

ND Rating				
690V, 60 Hz Input				
Code	**Amps**	**kW**	**Hp**	**Frame**
380	380	355	475	3A
705	705	657	881	3B

d

Enclosure		
Code	**Enclosure**	**Conformal Coating**
A	IP20, NEMA/UL Type 1 §	No
N	IP00, Open Chassis ♣	No

§ Frames 3A & 3B complete drive.

♣ Frame 2 only.

e

HIM	
Code	**Operator Interface**
0	No HIM/Blank Cover
3	Full Numeric LCD (Frame 2 Only)
C	Full Numeric LCD, Door Mount (Frames 3A & 3B Only)

f

Documentation		
Code	**Documents**	**Ship Carton**
E	English Doc Set	Yes
N	No Documentation	Yes

g

Brake	
Code	**w/Brake IGBT**
N	No

h

Brake Resistor	
Code	**w/Resistor**
N	No

i

Equipment Type		
Code	**Description**	**Frame**
A	Complete Regenerative Drive	2, 3A & 3B

j

Comm Slot		
Code	**Communication Option**	**DPI™ User Installed Kit Cat. No. ‡**
N	None	N
C	DPI ControlNet (Coax) ∗	20-Comm-C
D	DPI DeviceNet ∗	20-Comm-D
E	DPI EtherNet/IP ∗	20-Comm-E
R	DPI RIO ∗	20-Comm-R
S	DPI RS-485 DF1 ∗	20-Comm-S
1	DriveLogix™ ControlNet (Coax) ❄	-
2	DriveLogix ControlNet Redundant (Coax) ❄	-
3	DriveLogix ControlNet (Fiber) ❄	-
4	DriveLogix ControlNet Redundant (Fiber) ❄	-
5	DriveLogix DeviceNet (Open Conn.) ❄	-
6	DriveLogix EtherNet/IP ❄	-

∗ 700 Vector Control uses DPI comm. slot options only.

❄ DriveLogix comm. slot options require 700S Phase II Control with DriveLogix5730.

‡ For 700S Phase II Control with DriveLogix5730, comm. slot option selections are mutually exclusive. For two communication adapters, (DPI and DriveLogix), select the DriveLogix comm. slot option and order the DPI user installed kit catalog number separately.

Position	1-3	4	5-7	8	9	10	11	12	13	14	15	16	17	18
	20L	E	800	A	0	E	N	N	A	N	1	0	W	A
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*

k

Control Options

Code	Control	Cassette	Logic Expansion	Synch-Link
1	700VC 24V I/O	Base	N/A	N/A
2	700VC 120V I/O	Base	N/A	N/A
A	700S Phase II	Expanded	No	No
B	700S Phase II	Expanded	No	Yes
C	700S Phase II	Expanded	Yes	No §
D	700S Phase II	Expanded	Yes	Yes §

§ Requires DriveLogix5730.

l

Feedback

Code	Control Option	Type
0	All	None
1	700VC	Encoder 5V/12V
A	700S Ph. II	Resolver ♣
B	700S Ph. II	Stegmann Hi-Resolution Encoder ♣
C	700S Ph. II	Multi-Device Interface ♣➢
E	700S Ph. II	2nd Encoder ♣

♣ Expanded cassette required.

➢ Multi-Device Interface allows the connection of the Stegmann and Temposonics linear sensors. The Temposonics sensor cannot be used to close motor control or speed loops.

m

Additional Config.

Code	Logix Option	Embedded Comm.
W	None	-
E	Phase II Control	No
K	Phase II Control w/DriveLogix5730	No
L	Phase II Control w/DriveLogix5730	EtherNet/IP

n

Coolant Type

Code	Coolant	Frame
A	Water	All

Standard Drive Product Selection

400V AC Three-Phase Drives

Output Amps (with 400V AC Induction Motor) (1)						Nominal Power Ratings				IP20, NEMA/UL Type 1 (2)	Frame Size	PWM Freq. (kHz)
Normal Duty			Heavy Duty			Normal Duty		Heavy Duty		Catalog No.		
Cont.	110% 1 Min.	150% 3 sec.	Cont.	150% 1 Min.	200% 3 sec.	kW	HP	kW	HP			
360	396	540	264	396	540	200	268	150	200	20LC360N0ENNAN10WA	2	4
650	715	975	475	715	975	370	500	270	365	20LC650A0ENNAN10WA	3A	4
1250	1375	1875	915	1375	1875	715	960	525	700	20LC1K2A0ENNAN10WA	3B	4

(1) Frame 2 ratings are based on 50°C ambient and 50°C coolant. Frame 3A and 3B ratings are based on 40°C ambient and 40°C coolant.

(2) Frames 3A and 3B only. Frame 2 drives are IP00, NEMA/UL Type Open.

480V AC Three-Phase Drives

Output Amps (with 480V AC Induction Motor) (1)						Nominal Power Ratings				IP20, NEMA/UL Type 1 (2)	Frame Size	PWM Freq. (kHz)
Normal Duty			Heavy Duty			Normal Duty		Heavy Duty		Catalog No.		
Cont.	110% 1 Min.	150% 3 sec.	Cont.	150% 1 Min.	200% 3 sec.	kW	HP	kW	HP			
360	396	540	264	396	540	224	300	175	235	20LD360N0ENNAN10WA	2	4
650	715	975	475	715	975	445	600	325	440	20LD650A0ENNAN10WA	3A	4
1250	1375	1875	915	1375	1875	860	1150	630	845	20LD1K2A0ENNAN10WA	3B	4

(1) Frame 2 ratings are based on 50°C ambient and 50°C coolant. Frame 3A and 3B ratings are based on 40°C ambient and 40°C coolant.

(2) Frames 3A and 3B only. Frame 2 drives are IP00, NEMA/UL Type Open.

600V AC Three-Phase Drives

Output Amps (with 600V AC Induction Motor) (1)						Nominal Power Ratings				IP20, NEMA/UL Type 1	Frame Size	PWM Freq. (kHz)
Normal Duty			Heavy Duty			Normal Duty		Heavy Duty		Catalog No.		
Cont.	110% 1 Min.	150% 3 sec.	Cont.	150% 1 Min.	200% 3 sec.	kW	HP	kW	HP			
425	470	640	315	470	640	345	465	255	345	20LE425A0ENNAN10WA	3A	4
800	885	1200	590	885	1200	650	870	480	640	20LE800A0ENNAN10WA	3B	4
1175	1295	1765	860	1295	1765	955	1275	695	935	20LE1K1A0ENNAN10WA	3B	2 (2)

(1) Frame 3A and 3B ratings are based on 40°C ambient and 40°C coolant.

(2) Must operate at 2 kHz PWM only, and only as a stand-alone inverter module ("K" in catalog string position 13).

690V AC Three-Phase Drives

Output Amps (with 690V AC Induction Motor) (1)						Nominal Power Ratings				IP20, NEMA/UL Type 1	Frame Size	PWM Freq. (kHz)
Normal Duty			Heavy Duty			Normal Duty		Heavy Duty		Catalog No.		
Cont.	110% 1 Min.	150% 3 sec.	Cont.	150% 1 Min.	200% 3 sec.	kW	HP	kW	HP			
380	420	570	280	420	570	355	475	260	350	20LF380A0ENNAN10WA	3A	4
705	780	1060	520	780	1060	657	881	485	650	20LF705A0ENNAN10WA	3B	4
1050	1155	1575	770	1155	1575	980	1315	720	965	20LF1K0A0ENNAN10WA		2 (2)

(1) Frame 3A and 3B ratings are based on 40°C ambient and 40°C coolant.

(2) Must operate at 2 kHz PWM only, and only as a stand-alone inverter module ("K" in catalog string position 13).

Factory Installed Options

Human Interface and Wireless Interface Modules IP20, NEMA/UL Type 1 *(Position e)*

Cat. Code: 0
No HIM (Blank Plate)

Cat. Code: 3
LCD Display, Full Numeric Keypad

Cat. Code: C
Door Mounted Bezel LCD Display, Full Numeric Keypad NEMA/UL Type 1

Documentation

Description	Cat. Code (Position f)
English Documentation Set	E
No Documentation	N

Internal Communication Adapters

Description	Cat. Code (Position j)
None	N
ControlNet™ Communication Adapter (Coax) ‡	C
DeviceNet™ Communication Adapter ‡	D
EtherNet/IP™ Communication Adapter ‡	E
Remote I/O Communication Adapter ‡	R
RS485 DF1 Communication Adapter ‡	S
DriveLogix Comm Option, ControlNet (Coax) §	1
DriveLogix Comm Option, ControlNet Redundant (Coax) §	2
DriveLogix Comm Option, ControlNet (Fiber) §	3
DriveLogix Comm Option, ControlNet Redundant (Fiber) §	4
DriveLogix Comm Option, DeviceNet (Open Conn.) §	5
DriveLogix Comm Option, EtherNet/IP (Twisted Pair) §	6

‡ 700 Vector Control uses DPI comm. slot options only.
§ DriveLogix comm. slot option requires 700S Phase II Control with DriveLogix5730.

Control Options

Control Option	Description	Cat. Code (Position k)
700VC - 24V I/O	Base Cassette	1
700VC - 115V I/O	Base Cassette	2
Phase II Control	Expanded Cassette Only	A
	Expanded Cassette w/SynchLink	B
Phase II Control ∗	Expanded Cassette w/Logix Expansion Board	C
	Expanded Cassette w/Logix Expansion Board & SynchLink	D

∗ Requires DriveLogix5730.

Feedback Options

Control Type	Description	Cat. Code (Position l)
All	No Encoder	0
700VC	12V/5V Encoder	1
700S Phase II	Resolver, 10…26V, 10 kHz, 10…16 bit	A
	Stegmann - High Resolution Encoder Hyperface, 8.5V dc, 20 bit, 100k/r §	B
	Multi-Device Interface - for Stegmann or Linear Temposonics §	C
	2nd Encoder, 5V or 12V Configurable by the Drive §	E
	DriveGuard Safe-Off (w/2nd Encoder) §	S

§ Requires Expanded Cassette.

Additional 700S Configurations

Description	Embedded Communication	Cat. Code (Position m)
None	—	W
Phase II Control	No	E
Phase II Control, with DriveLogix5730 Controller	No	K
Phase II Control, with DriveLogix5730 Controller & EtherNet/IP	EtherNet/IP	L

Coolant Options

Description	Frame	Cat. Code (Position n)
Water	All	A

User Installed Options

Human Interface and Wireless Interface Modules

No HIM (Blank Plate)
20-HIM-A0

LCD Display, Full Numeric Keypad
20-HIM-A3

LCD Display, Programmer Only
20-HIM-A5

Wireless Interface Module
20-WIM-N1

Remote (Panel Mount) LCD Display, Full Numeric Keypad
20-HIM-C3S

Remote (Panel Mount) LCD Display, Programmer Only
20-HIM-C5S

Remote (Panel Mount) Wireless Interface Module
20-WIM-N4S

Description	Handheld/Local (Drive Mount) Cat. No.	Remote (Panel Mount) IP66, NEMA/UL Type 4x/12 ∗ Cat. No.
No HIM (Blank Plate)	20-HIM-A0	–
LCD Display, Full Numeric Keypad	20-HIM-A3	20-HIM-C3S §
LCD Display, Programmer Only	20-HIM-A5	20-HIM-C5S §
Wireless Interface Module	20-WIM-N1	20-WIM-N4S

∗ For indoor use only.
§ Includes a 1202-C30 interface cable (3 meters) for connection to drive.

Human Interface Module Accessories

Description	Cat. No.
Bezel Kit for LCD HIMs, NEMA/UL Type 1 §	20-HIM-B1
PowerFlex HIM Interface Cable, 1 m (39 in) ♣	20-HIM-H10
Cable Kit (Male-Female) ➢	
0.33 Meters (1.1 Feet)	1202-H03
1 Meter (3.3 Feet)	1202-H10
3 Meter (9.8 Feet)	1202-H30
9 Meter (29.5 Feet)	1202-H90
DPI/SCANport™ One to Two Port Splitter Cable	1203-S03

§ Includes a 1202-C30 interface cable (3 meters) for connection to drive.
♣ Required only when HIM is used as handheld or remote.
➢ Required in addition to 20-HIM-H10 for distances up to a total maximum of 10 Meters (32.8 Feet).

Communication Option Kits

Description	Cat. No.
ControlNet™ Communication Adapter (Coax)	20-COMM-C
DeviceNet™ Communication Adapter	20-COMM-D
EtherNet/IP™ Communication Adapter	20-COMM-E
Interbus™ Communication Adapter	20-COMM-I
CANopen® Communication Adapter	20-COMM-K
Modbus/TCP Communication Adapter	20-COMM-M
PROFIBUS™ DP Communication Adapter	20-COMM-P
ControlNet™ Communication Adapter (Fiber)	20-COMM-Q
Remote I/O Communication Adapter	20-COMM-R
RS485 DF1 Communication Adapter	20-COMM-S
DriveLogix ControlNet Communication Adapter (Coax) ✶❖	1788-CNC
DriveLogix Comm Option, ControlNet Redundant (Coax) ✶❖	1788-CNCR
DriveLogix Comm Option, ControlNet (Fiber) ✶❖	1788-CNF
DriveLogix Comm Option, ControlNet Redundant (Fiber) ✶❖	1788-CNFR
DriveLogix Comm Option, DeviceNet (Open Conn.) ✶❖	1788-DNBO
DriveLogix Comm Option, EtherNet/IP (Twisted Pair) ✶❖	1788-ENBT
DriveLogix5730 Comm Option, Embedded EtherNet/IP	20D-DL2-ENET0
External Communications Kit Power Supply	20-XCOMM-AC-PS1
DPI External Communications Kit	20-XCOMM-DC-BASE
External DPI I/O Option Board ✦	20-XCOMM-IO-OPT1
Compact I/O Module (3 Channel)	1769-SM1

✶ For use with DriveLogix option only.
✦ For use only with External DPI Communications Kits 20-XCOMM-DC-BASE.
❖ Requires Logix Expansion Board (20D-DL2-LEB0).

Communication Accessories

Description	Cat. No.
Serial Null Modem Adapter	1203-SNM
Smart Self-powered Serial Converter (RS232) includes 1203-SFC and 1202-C10 Cables	1203-SSS
Universal Serial Bus™ (USB) Converter includes 2m USB, 20-HIM-H10 & 22-HIM-H10 Cables	1203-USB
ControlNet Ex Right-Angle T-Tap 1 Meter Coax Cable Assembly	1786-TPR

PC Programming Software

Description	
DriveTools™ SP Software ✦	See publication PFLEX-SG002 for further information.
DriveExplorer™ Software (Lite/Full) ✦❖	
Pocket DriveExplorer™ Software	

✦ Set-up wizards are available for use with DriveTools SP and DriveExplorer (Lite/Full) only.
❖ DriveExplorer Lite is available for free download at: http://www.ab.com/drives/driveexplorer/free_download.html.

Accessories

Note: Please refer to publication number 1756-TD008 for details on SynchLink.

Description	Cat. No.
SynchLink Board	20D-P2-SLB0
SynchLink Fiber Base Block	1751-SLBA
SynchLink 4-port Fiber Splitter Block	1751-SL4SP
SynchLink Fiber Bypass Switch Block	1751-SLBP
2x1 Meter Fiber Link for Power Monitor/SynchLink	1403-CF001
2x3 Meter Fiber Link for Power Monitor/SynchLink	1403-CF003
2x5 Meter Fiber Link for Power Monitor/SynchLink	1403-CF005
10 Meter Fiber Link for Power Monitor/SynchLink	1403-CF010
20 Meter Fiber Link for Power Monitor/SynchLink	1403-CF020
50 Meter Fiber Link for Power Monitor/SynchLink	1403-CF050
100 Meter Fiber Link for Power Monitor/SynchLink	1403-CF100
250 Meter Fiber Link for Power Monitor/SynchLink	1403-CF250

Feedback Option Kits

Description	Cat. No.
Multi-Device Interface ➢	20D-MDI-C2
DriveGuard Safe-Off (w/2nd Encoder) ➢	20D-P2-DG01
2nd Encoder, 5V/12V ➢	20D-P2-ENC0
Resolver ➢	20D-RES-A1
Stegmann High Resolution Hyperface Encoder ➢	20D-STEG-B1

➢ Requires Expanded Cassette.

DriveLogix Option Kits

Description	Cat. No.
Logix Expansion board for DriveLogix5730 ➢	20D-DL2-LEB0
Industrial Compact Flash 64K Memory Card	1784-CF64

➢ Requires Expanded Cassette.

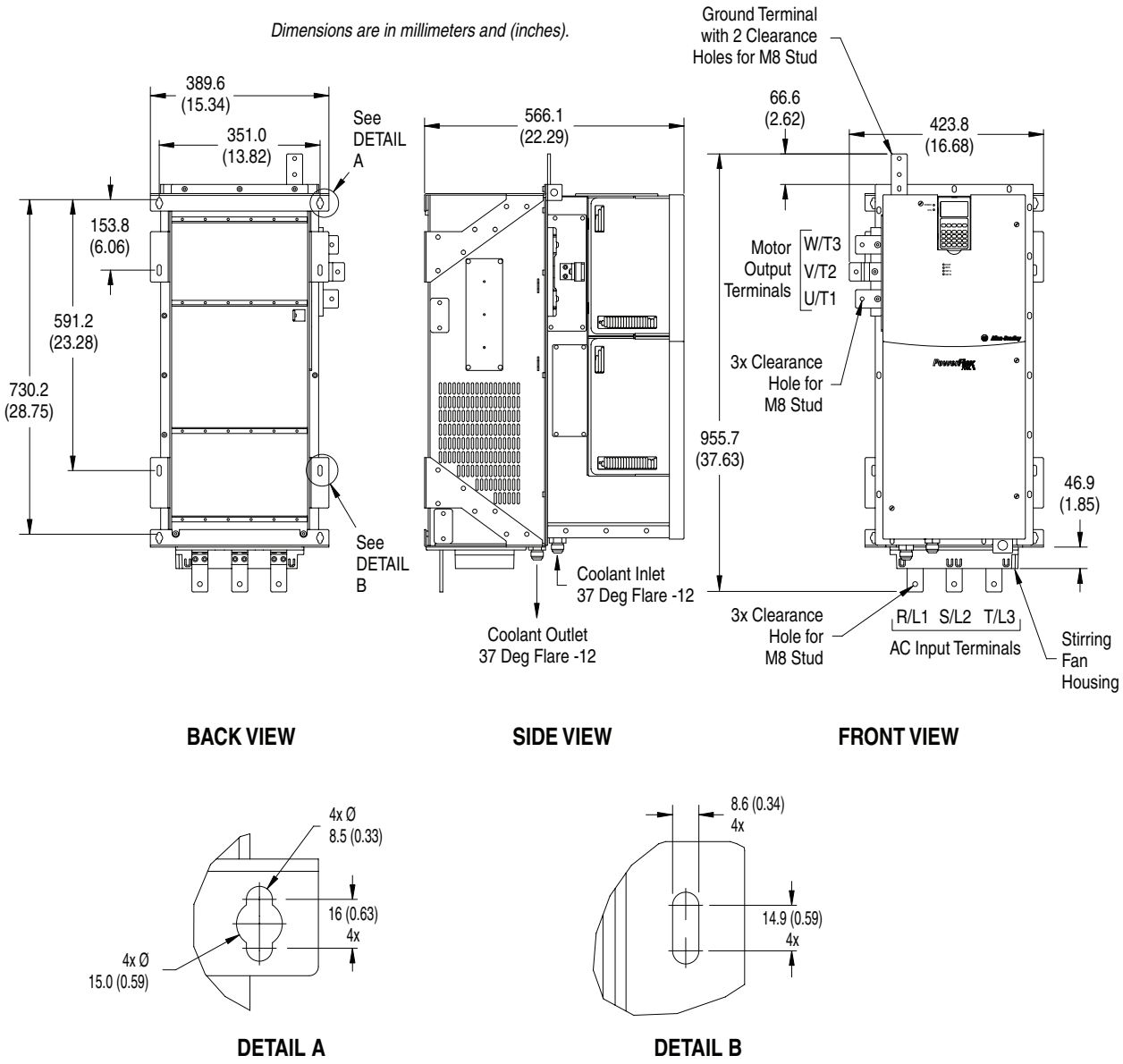
DriveLogix I/O Cables

Description	Cat. No.
DriveLogix5730 - Compact I/O cable, 3.28 ft. (1 meter), Left Bus Cap➢§	20D-DL2-CL3
DriveLogix5730 - Compact I/O cable, 3.28 ft. (1 meter), Right Bus Cap ➢§	20D-DL2-CR3
Logix5000 RS-232 Programming Cable	1756-CP3

➢ Requires Expanded Cassette.
§ Refer to Publication 1769-SG001 for details and selection of Compact I/O.

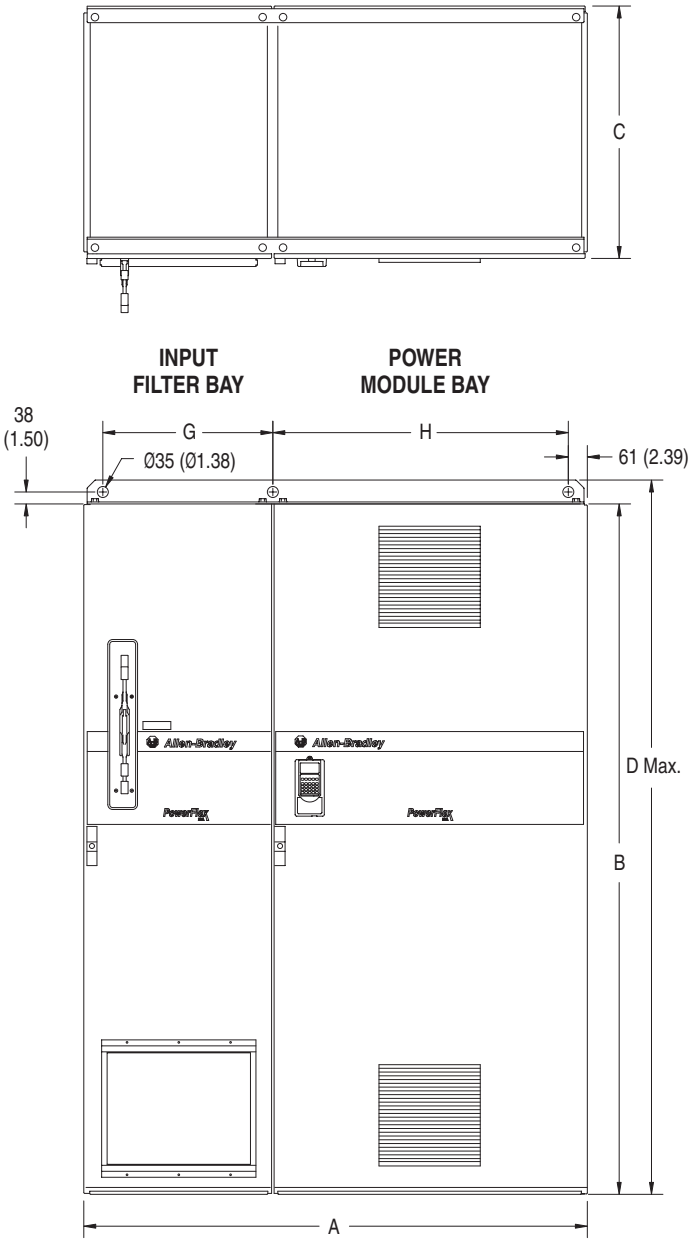
Product Dimensions

Frame 2 Drive



Weight: 186 kg (410 lbs.)

Frame 3A/3B Drive



Dimensions are in millimeters and (inches).

Frame Size	Dimensions									Weight kg (lbs.)
	A	B	C	D	E	F	G	H	J	Complete Drive
3A	1200 (47.2)	2000 (78.7)	600 (23.6)	2078 (81.9)	1500 (59.1)	233 (9.2)	542 (21.3)	542 (21.3)	535 (21.1)	950 (2090)
3B	1600 (63.0)	2200 (86.6)	800 (31.5)	2278 (89.8)	1500 (59.1)	233 (9.2)	542 (21.3)	942 (37.1)	735 (28.9)	1361 (3000)

Installation Considerations

Power Wiring

The PowerFlex 700L has the following built in protective features to help simplify installation:

- Ground fault protection during start up and running ensures reliable operation
- Electronic motor overload protection increases motor life

AC Supply Source Considerations

PowerFlex 700L Liquid-Cooled AC drives are suitable for use on a circuit capable of delivering up to a maximum of 200,000 rms symmetrical amperes.

PowerFlex 700L Liquid Cooled AC drives should not be used on undersized or high-impedance supply systems. The supply system kVA should be equal to or greater than the drive-rated kW, and the system impedance should be less than 10%. Operation outside these limits could cause instability resulting in drive shutdown.

PowerFlex 700L Liquid Cooled AC drives have a built-in LCL filter which includes a 3% input line reactor. Additional input line reactors are not recommended.

Unbalanced, Ungrounded or Resistive Grounded Distribution Systems

Removable MOV to ground and common mode capacitors to ground ensure compatibility with ungrounded systems. These devices must be disconnected if the drive is installed on a resistive grounded distribution system, an ungrounded distribution system, or a B phase grounded distribution system. These devices must also be disconnected if a regenerative unit is used as a bus supply or brake.

Input Power Conditioning

Certain events on the power system supplying a drive can cause component damage or shortened product life. They are:

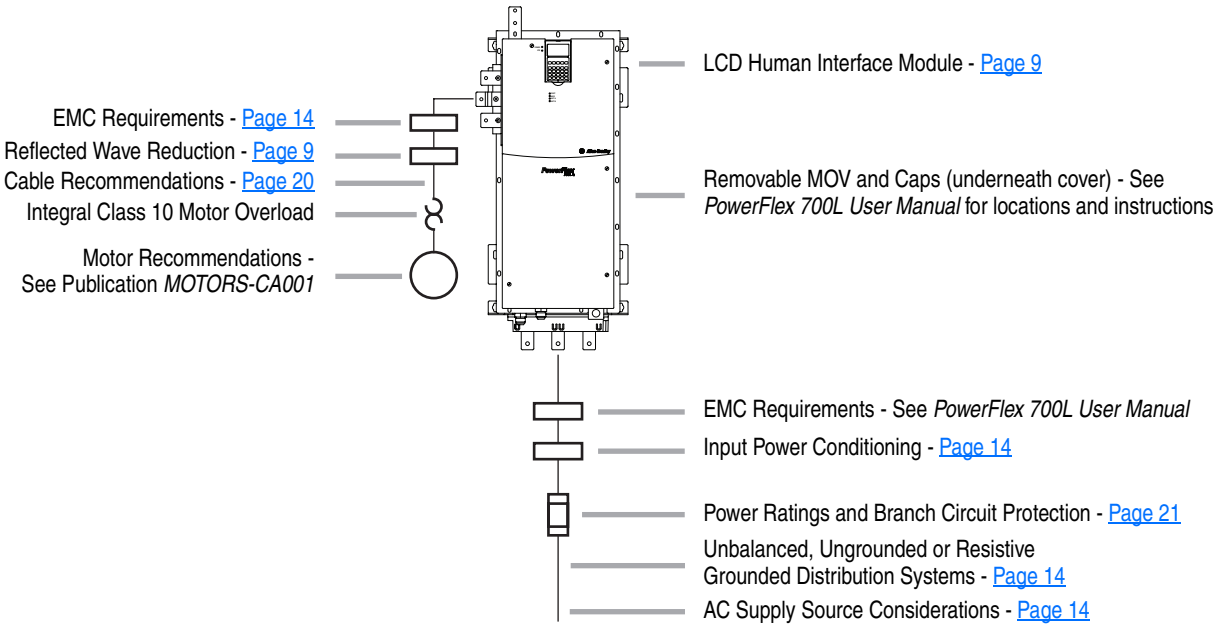
- The power system has power factor correction capacitors switched in and out of the system, either by the user or by the power company.
- The power source has intermittent voltage spikes in excess of 6000 volts. These spikes could be caused by other equipment on the line or by events such as lightning strikes.
- The power source has frequent interruptions.

There are many other factors that must be considered for optimal performance in any given application. The block diagram below highlights the primary installation considerations. For detailed recommendations on input power conditioning, reflected wave protection, and motor cable types, refer to *Wiring and Grounding Guidelines for AC Drives (publication DRIVES-IN001)* available online at www.rockwellautomation.com/literature.

EMC Requirements

The 700VC control option for Frame 2 comes with two common mode chokes — one for input and one for output. The 700S control option for Frame 2 requires a field-installed kit SK-L1-CHK2-F2. See the *PowerFlex 700L User Manual (publication 20L-UM001)* for other CE requirements. PowerFlex 700L Frame 3A and 3B drives do not require common mode chokes for CE compliance.

(Frame 2 Drive shown)

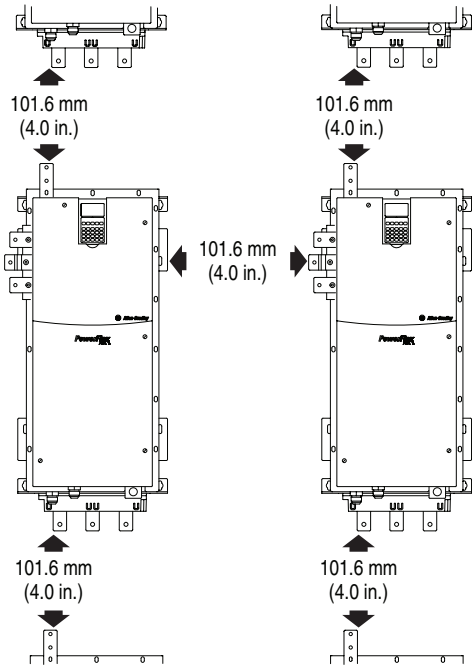


Frame 2 Drive

Recommended Mounting Clearances

Specified vertical clearance requirements are intended to be from drive to drive. Other objects can occupy this space; however, reduced air flow may cause protection circuits to fault the drive. In addition, inlet air temperature must not exceed the product specification.

Frame 2 Drive Clearances



Mounting Requirements

The PowerFlex700L Frame 2 drive is a single integrated assembly consisting of a filter section and a power section. The filter section provides the mounting feet and represents greater than 50% of the approximately 186 kg (410 lb.) total weight.

- The Frame 2 drive should be mounted into an enclosure that is designed according to Electrical Equipment Pollution Degree 2 requirements.
- Any enclosure mounting panel needs to be sized and fastened appropriately to accommodate for the weight of the drive.
- The Frame 2 drive is designed to use eight M8 x 1.25 fasteners in mounting slots shown in Detail A and Detail B of the drawing on page 12.
- The M8 x 1.25 fasteners shall be class 5.8 or greater.
- The fasteners shall use a lock washer or similar mechanism to prevent loosening after mounting.

- All M8 x 1.25 fastener threads shall engage a steel panel with 6 to 7 full threads or a permanent backing nut such as a weld nut or a self-clinching PEM®(1) nut with 4 full threads.
- M8 x 1.25 fasteners shall be tightened to 11.3 ± 2.8 N•m (100 ± 25 lb•in) unless the lock washer mechanism requires a different torque. If this is the case, the holding force shall be equivalent.

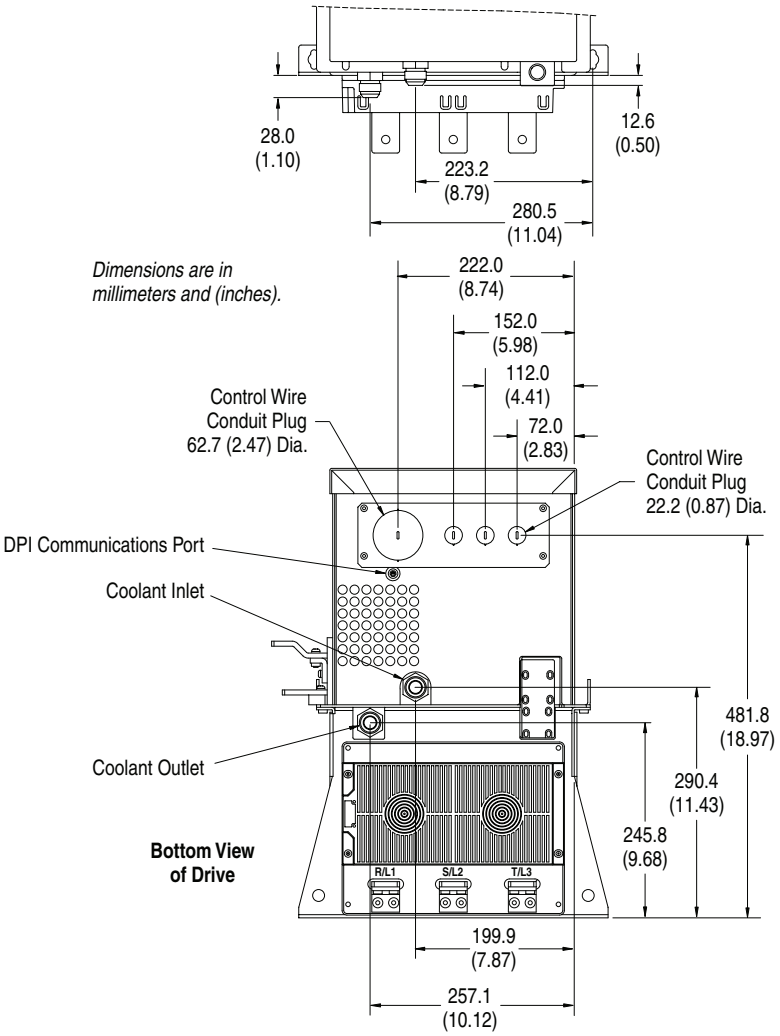
Determining Wire Routing for Control, Ground, Drive Input, and Motor Output

All wiring should be installed in conformance with the applicable local, national, and international codes (e.g., NEC/CEC). Signal wiring, control wiring, and power wiring must be routed in separate conduits to prevent interference with drive operation. Use grommets, when hubs are not provided, to guard against wire chafing.

Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

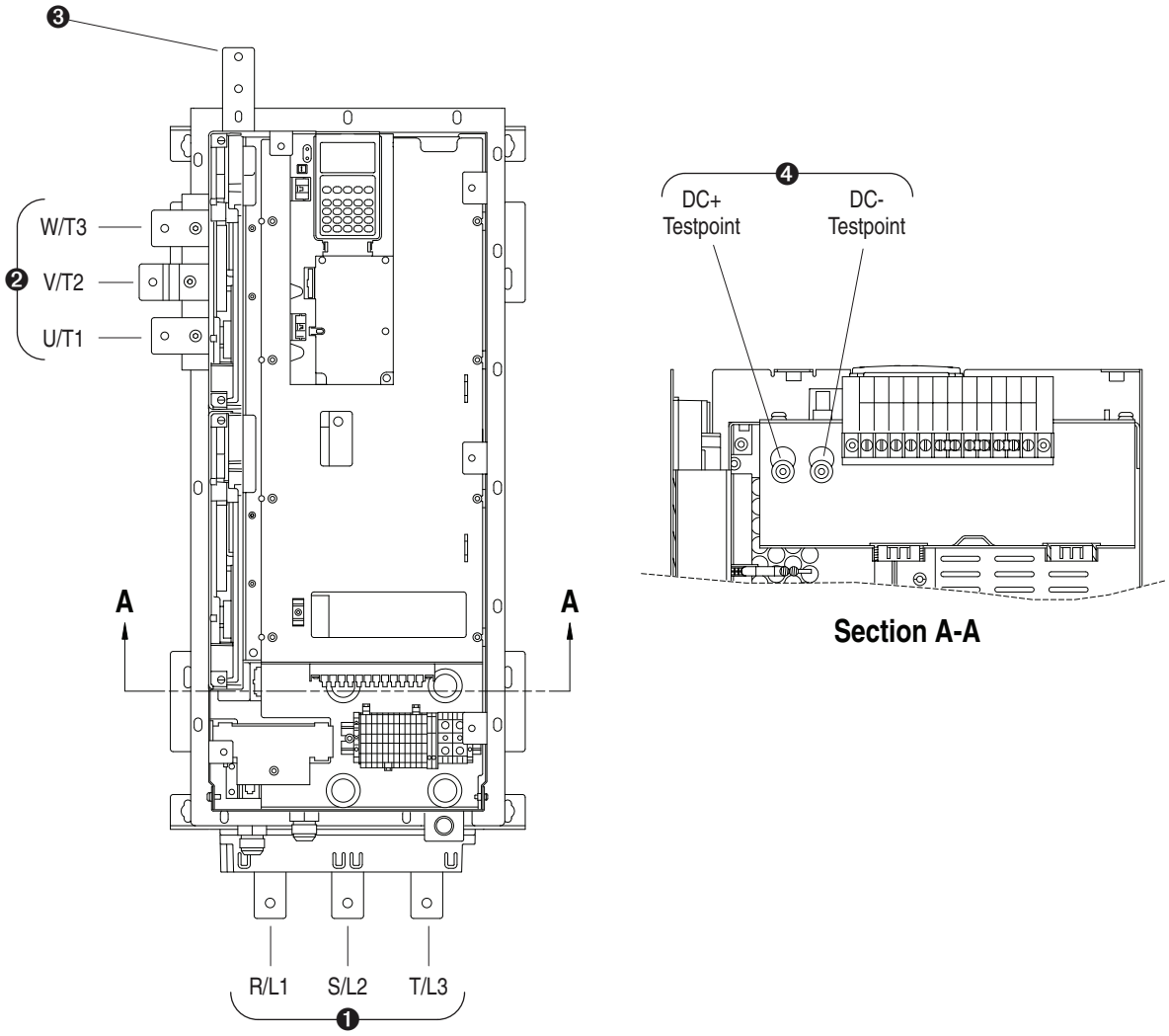
Do not route more than three sets of motor leads through a single conduit. This will minimize cross-talk that could reduce the effectiveness of noise reduction methods. If more than three drive/motor connections per conduit are required, shielded cable must be used. If possible, each conduit should contain only one set of motor leads.

Frame 2 Locations for Control Wire Routing, DPI Communications Port, and Coolant Connections.



(1) PEM is a registered trademark of PennEngineering.

Frame 2 Power Terminal Locations



Frame 2 Power Terminal Specifications

Item	Name	Description	Recommended Tightening Torque (±10%)	Terminal Bolt Size (1)
1	Input Power Bus Bar (2) R/L1, S/L2, T/L3	Input power	40 N•m (354 lb•in)	M8
2	Output Power Bus Bar (2) U/T1, V/T2, W/T3	Motor connections	40 N•m (354 lb•in)	M8
3	PE, Motor Ground Bus Bar (2)	Terminating point for wiring shields and grounds	40 N•m (354 lb•in)	M8
4	DC Bus Test Point Socket (3) (2 Terminals; DC+, DC-)	4 mm socket for DC bus voltage measurement only	—	—

(1) Apply counter torque to the nut on the other side of terminations when tightening or loosening the terminal bolt to avoid damage to the terminal.

(2) These connections are bus bar type terminations and require the use of lug connectors.

(3) Use only to verify that DC bus capacitors are discharged before servicing the Power Module. No other external use is permitted.

Frame 3A/3B Drive

Recommended Mounting Clearances

Be sure there is adequate clearance for air circulation around the drive enclosures. A 15 cm (6-in.) minimum clearance is required wherever vents are located in the cabinet.

Determining Wire Routing for Control, Ground, Drive Input, and Motor Output

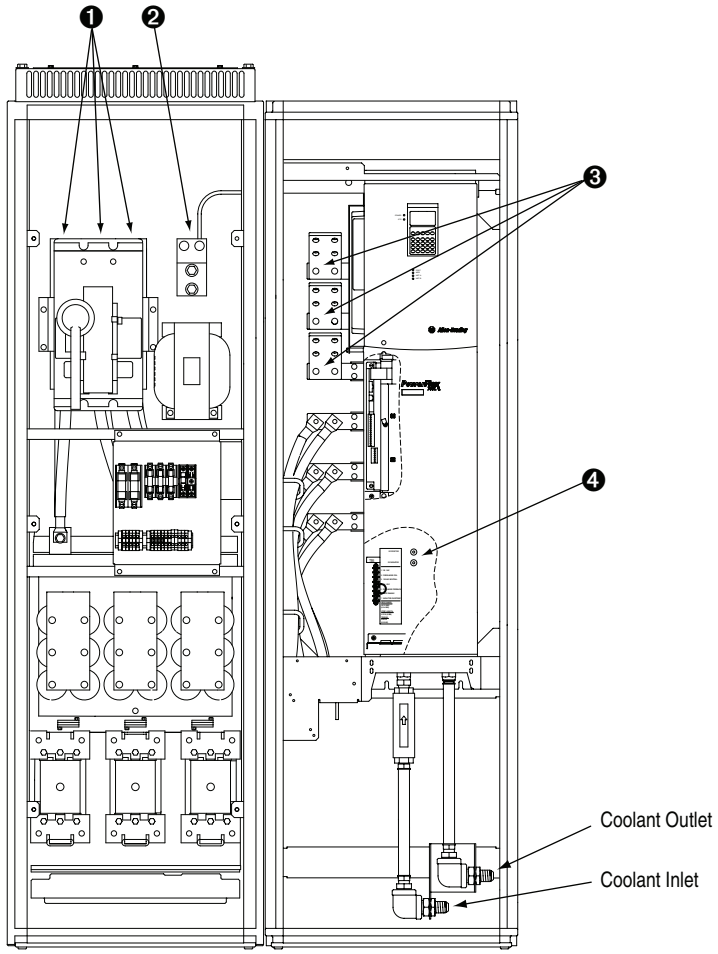
All wiring should be installed in conformance with the applicable local, national, and international codes (e.g., NEC/CEC). Signal wiring, control wiring, and power wiring must be routed in separate conduits to prevent interference with drive operation. Use grommets, when hubs are not provided, to guard against wire chafing.

Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Do not route more than three sets of motor leads through a single conduit. This will minimize cross-talk that could reduce the effectiveness of noise reduction methods. If more than three drive/motor connections per conduit are required, shielded cable must be used. If possible, each conduit should contain only one set of motor leads.

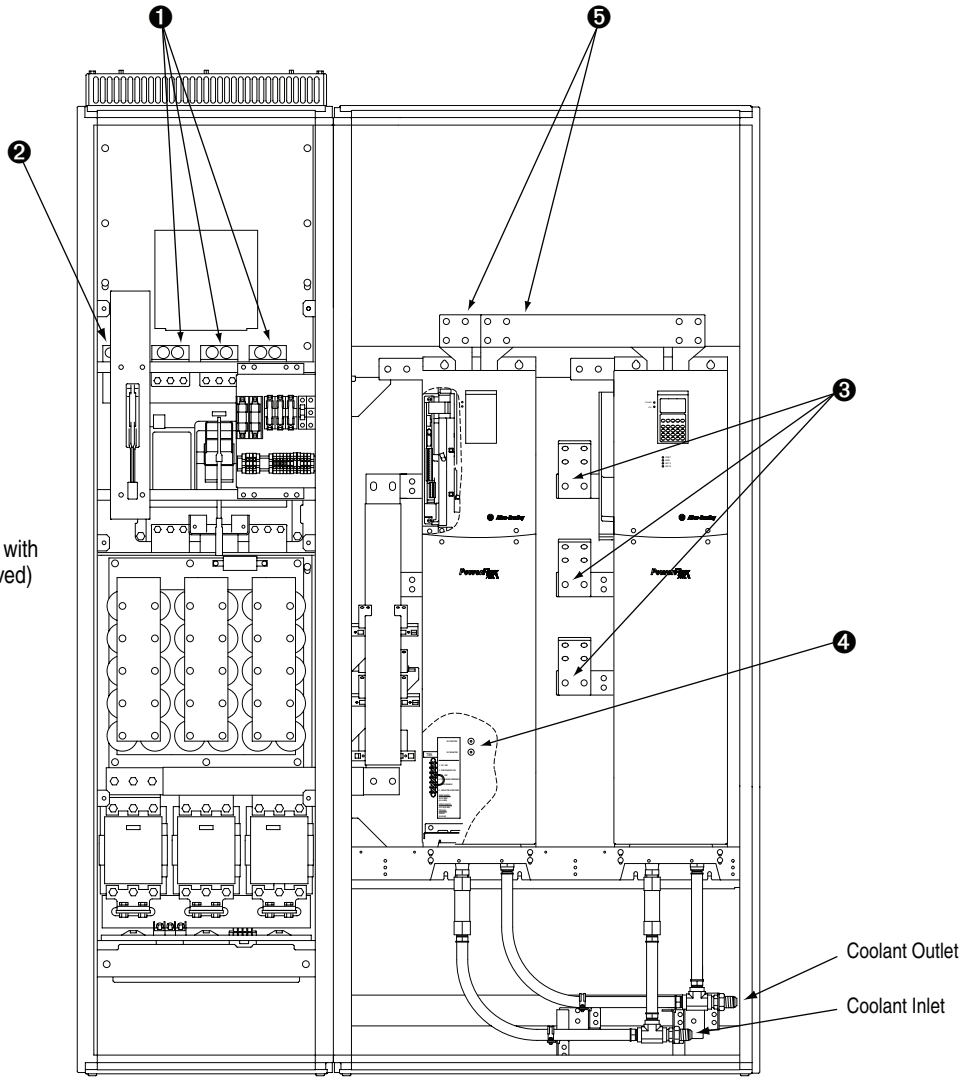
Frame 3A Power Terminal Locations

(Drive shown with doors removed)



Frame 3B Power Terminal Locations

(Drive shown with doors removed)



Frame 3A/3B Power Terminal Specifications

Item	Name	Description	Frame Size	Wire Size Range (1)		Recommended Tightening Torque (±10%)
				Maximum	Minimum	
1	Input Power Wire Lugs R/L1, S/L2, T/L3	Input power connections on drive	3A	400 MCM	3/0	42 N•m (375 lb•in)
			3B	1000 MCM	500 MCM	62 N•m (550 lb•in)
2	PE Wire Lug	Terminating point for ground wires	3A or 3B	600 MCM	# 2 AWG	34 N•m (300 lb•in)
3	Output Power Bus Bar (2) U/T1, V/T2, W/T3	Motor connections	3A or 3B			62 N•m (550 lb•in)
4	DC Bus Test Point Socket (3) (2 Terminals; DC+, DC-)	4 mm socket for DC bus voltage measurement only	3A or 3B	—	—	—
5	DC Power Bus Bar (2) (4) (2 Terminals; DC+, DC-)	DC power from Converter Power Module to Inverter Power Module	3B			62 N•m (550 lb•in)

(1) Maximum/minimum sizes that the terminals will accept - these are not recommendations.

(2) These connections are bus bar type terminations and require the use of lug connectors.

(3) Use only to verify that DC bus capacitors are discharged before servicing the Power Module. No other external use is permitted.

(4) Size DC power conductors for current carrying capacity as follows: 400/480V, 1000 Amps; 600/690V, 800 Amps.

Cable Recommendations

Cable Types Acceptable for 200-600 Volt Installations

A variety of cable types are acceptable for drive installations. For many installations, unshielded cable is adequate, provided it can be separated from sensitive circuits. As an approximate guide, allow a spacing of 0.3 meters (1 foot) for every 10 meters (32.8 feet) of length. In all cases, long parallel runs must be avoided. Do not use cable with an insulation thickness less than or equal to 15 mils (0.4mm/0.015 in.). Use Copper wire only. Wire gauge requirements and recommendations are based on 75°C (167°F). Do not reduce wire gauge when using higher temperature wire. See table below.

Unshielded Cable

THHN, THWN or similar wire is acceptable for drive installation in dry environments provided adequate free air space and/or conduit fill rates limits are provided. **Do not use THHN or similarly coated wire in wet areas**. Any wire chosen must have a minimum insulation thickness of 15 mils (0.4mm/0.015 in.) and should not have large variations in insulation concentricity.

Shielded Cable

Shielded cable contains all of the general benefits of multi-conductor cable with the added benefit of a copper braided shield that can contain much of the noise generated by a typical AC drive. Strong consideration for shielded cable should be given in installations with sensitive equipment such as weigh scales, capacitive proximity switches, and other devices that may be affected by electrical noise in the distribution system. Applications with large numbers of drives in a similar location, imposed EMC regulations or a high degree of communications/networking are also good candidates for shielded cable.

Shielded cable may also help reduce shaft voltage and induced bearing currents for some applications. In addition, the increased impedance of shielded cable may help extend the distance that the motor can be located from the drive without the addition of motor protective devices such as terminator networks. Refer to “Reflected Wave” in *Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication DRIVES-IN001*.

Consideration should be given to all of the general specifications dictated by the environment of the installation, including temperature, flexibility, moisture characteristics, and chemical resistance. In addition, a braided shield should be included and be specified by the cable manufacturer as having coverage of at least 75%. An additional foil shield can greatly improve noise containment.

A good example of recommended cable is Belden® 29528-29532 (AWG-1 through AWG-410). This cable has 3 XLPE insulated conductors plus ground with a spiral copper shield surrounded by a PVC jacket.

Other types of shielded cable are available, but the selection of these types may limit the allowable cable length. Particularly, some of the newer cables twist 4 conductors of THHN wire and wrap them tightly with a foil shield. This construction can greatly increase the cable charging current required and reduce the overall drive performance. These cables are not recommended.

Armored Cable

Cable with continuous aluminum armor is often recommended in drive system applications or specific industries. It offers most of the advantages of standard shielded cable and also combines considerable mechanical strength and resistance to moisture. It can be installed in concealed and exposed manners and removes the requirement for conduit (EMT) in the installation. It can also be directly buried or embedded in concrete.

Because noise containment can be affected by incidental grounding of the armor to building steel (see “Wire Types” in *Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication DRIVES-IN001)* when the cable is mounted, it is recommended the armor cable have an overall PVC jacket.

Interlocked armor is acceptable for shorter cable runs, but continuous welded armor is preferred.

Best performance is achieved with three spaced ground conductors, but acceptable performance below 200 HP is provided via a single ground conductor.

Location	Cable Rating/Type	Description
Standard (Option 1)	1000V, 90°C (194°F) XHHW2/RHW-2 Anixter B29528-B29532, Belden 29528-29532, or equivalent	• Four tinned copper conductors with XLPE insulation. • Copper braid/aluminum foil combination shield and tinned copper drain wire. • PVC jacket.
Standard (Option 2)	Tray rated 1000V, 90°C (194°F) RHH/RHW-2 Anixter OLFLEX-76xxx03 or equivalent	• Three tinned copper conductors with XLPE insulation. • Corrugated copper tape with three bare copper grounds in contact with shield. • PVC jacket.
Class I & II; Division I & II	Tray rated 1000V, 90°C (194°F) RHH/RHW-2 Anixter 7VFD-xxxx or equivalent	• Three bare copper conductors with XLPE insulation and impervious corrugated continuously welded aluminum armor. • Black sunlight resistant PVC jacket overall. • Three copper grounds.

Cable Trays and Conduit

If cable trays or large conduits are to be used, refer to guidelines presented in the *Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication DRIVES-IN001*.

Power Ratings and Branch Circuit Protection

Frame 2 Drive

Most codes require that upstream branch circuit protection be provided to protect input power wiring.

The Frame 2 drive does not provide input power short circuit protection. The tables below provide drive ratings and recommended AC line input fuse and circuit breaker information. Both types of short circuit protection are acceptable for UL and IEC requirements. Sizes listed are the recommended sizes based on 40°C and the U.S. N.E.C. Other country, state or local codes may require different ratings.

Fusing

If fuses are chosen as the desired protection method, refer to the recommended types listed below. If available amp ratings do not match the tables provided, the closest fuse rating that exceeds the drive rating should be chosen.

- IEC – BS88 (British Standard) Parts 1 & 2 (1), EN60269-1, Parts 1 & 2, type gG or equivalent should be used.
- UL – UL Class T, J or L must be used.

(1) Typical designations include, but may not be limited to the following; Parts 1 & 2: AC, AD, BC, BD, CD, DD, ED, EFS, EF, FF, FG, GF, GG, GH.

Circuit Breakers

The “non-fuse” listings in the tables below include both circuit breakers (inverse time or instantaneous trip). **If one of these is chosen as the desired protection method**, the following requirements apply.

- IEC and UL – Both types of devices are acceptable for IEC and UL installations.

400 Volt AC Input Protection Devices

Drive Cat. No.	Frame	HP (kW) Rating		Input Rating	Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (3)	Motor Circuit Protector (5)
		ND	HD	Amps	Min. (1)	Max. (2)	Min.	Max.	Max. (4)	Max.
20LC360	2	268 (200)	—	360	500	750	500	900	900	600
		—	200 (150)	264	400	650	450	900	900	400

(1) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.
(2) Maximum protection device size is the highest rated device that supplies drive protection. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.
(3) Circuit Breaker - inverse time breaker. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum
(4) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.
(5) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC minimum size is 125% of motor FLA. Ratings shown are maximum

480 Volt AC Input Protection Devices

Drive Cat. No.	Frame	HP (kW) Rating		Input Rating	Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (3)	Motor Circuit Protector (5)
		ND	HD	Amps	Min. (1)	Max. (2)	Min.	Max.	Max. (4)	Max.
20LD360	2	300 (224)	—	360	500	750	500	900	900	600
		—	235 (175)	264	400	650	450	900	900	400

(1) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.
(2) Maximum protection device size is the highest rated device that supplies drive protection. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.
(3) Circuit Breaker - inverse time breaker. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum
(4) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.
(5) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC minimum size is 125% of motor FLA. Ratings shown are maximum

Frame 3A/3B Drive

Frame 3A/3B Complete Drives include an input power circuit breaker. The value of the circuit breaker provided with the drive is listed in the table below.

Frame Size	Input Voltage	Circuit Breaker Provided	Shunt Trip Rating
3A	400-480V AC	800 A	65 kAIC
	575-690V AC	800 A	35 kAIC
3B	400-480V AC	1500 A	100 kAIC
	575-690V AC	1500 A	35 kAIC

Maximum Motor Cable Lengths

In the following tables, a "●" in any of the latter columns will indicate that this drive rating can be used with an Allen-Bradley Terminator (1204-TFA1/1204-TFB2) and/or Reflected Wave Reduction Device with Common Mode Choke (1204-RWC-17) or without choke (1204-RWR2).

For the Terminator, the maximum cable length is 182.9 meters (600 feet) for 400/480/600V drives (not 690V). The PWM frequency must be 2 kHz.

The 1321-RWR is a complete reflected wave reduction solution available for many of the PowerFlex drives. If available, a 1321-RWR catalog number will be indicated in the "Reactor/RWR" column. When not available, use the reactor and resistor information provided to build a solution.

For Further Information on...	*See Publication...*
1204-TFxx	1204-IN002

PowerFlex 700L with 700VC Control, 400V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution				Reactor Only				Reactor + Damping Resistor				Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
2	268 (200)	2	24.4 (80)	91.4 (300)	152.4 (500)	213.4 (700)	30.5 (100)	76.2 (250)	228.6 (750)	365.8 (1200)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	1321-3R400-B(1)	20	495		●		
		4	24.4 (80)	91.4 (300)	121.9 (400)	152.4 (500)	18.3 (60)	76.2 (250)	137.2 (450)	182.9 (600)	76.2 (250)	137.2 (450)	274.3 (900)	365.8 (1200)	1321-3R400-B(1)	20	990				
3A	500 (370)	2	24.4 (80)	91.4 (300)	152.4 (500)	213.4 (700)	30.5 (100)	76.2 (250)	228.6 (750)	365.8 (1200)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	1321-3R750-B(1)	20	735		●		
		4	24.4 (80)	91.4 (300)	121.9 (400)	152.4 (500)	18.3 (60)	76.2 (250)	137.2 (450)	182.9 (600)	76.2 (250)	137.2 (450)	274.3 (900)	365.8 (1200)	1321-3R750-B(1)	20	1470				
3B	960 (715)	2	24.4 (80)	76.2 (250)	129.5 (425)	160.0 (525)	91.4 (80)	76.2 (250)	152.4 (500)	228.6 (750)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	2 x 1321-3R600-B(2)	20	525				
		4	18.3 (60)	76.2 (250)	121.9 (400)	152.4 (500)	18.3 (60)	76.2 (250)	121.9 (400)	152.4 (500)	76.2 (250)	137.2 (450)	274.3 (900)	365.8 (1200)	2 x 1321-3R600-B(2)	20	1050				

(1) Requires two parallel cables.

(2) Requires four parallel cables.

PowerFlex 700L with 700VC Control, 480V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution				Reactor Only				Reactor + Damping Resistor				Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
2	300 (224)	2	12.2 (40)	30.5 (100)	91.4 (300)	121.9 (400)	12.2 (40)	36.6 (120)	99.1 (325)	137.2 (450)	61.0 (200)	137.2 (450)	274.3 (900)	365.8 (1200)	1321-3R400-B(1)	20	495		●		
		4	7.6 (25)	24.4 (80)	83.8 (275)	114.3 (375)	7.6 (25)	24.4 (80)	83.8 (275)	114.3 (375)	30.5 (100)	61.0 (200)	152.4 (500)	213.4 (700)	1321-3R400-B(1)	20	990				
3A	600 (445)	2	12.2 (40)	30.5 (100)	91.4 (300)	121.9 (400)	12.2 (40)	36.6 (120)	99.1 (325)	137.2 (450)	61.0 (200)	137.2 (450)	274.3 (900)	365.8 (1200)	1321-3R750-B(1)	20	735		●		
		4	7.6 (25)	24.4 (80)	83.8 (275)	114.3 (375)	7.6 (25)	24.4 (80)	83.8 (275)	114.3 (375)	30.5 (100)	61.0 (200)	152.4 (500)	213.4 (700)	1321-3R750-B(1)	20	1470				
3B	1150 (860)	2	12.2 (40)	24.4 (80)	83.8 (275)	114.3 (375)	12.2 (40)	30.5 (100)	91.4 (300)	121.9 (400)	61.0 (200)	137.2 (450)	274.3 (900)	365.8 (1200)	2 x 1321-3R600-B(2)	20	525				
		4	7.6 (25)	24.4 (80)	83.8 (275)	114.3 (375)	7.6 (25)	24.4 (80)	83.8 (275)	114.3 (375)	30.5 (100)	61.0 (200)	152.4 (500)	213.4 (700)	2 x 1321-3R600-B(2)	20	1050				

(1) Requires two parallel cables.

(2) Requires four parallel cables.

PowerFlex 700L with 700VC Control, 600V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution		Reactor Only		Reactor + Damping Resistor		Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1488V	1850V	1488V	1850V	1488V	1850V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
3A	465 (345)	2	24.4 (80)	106.7 (350)	24.4 (80)	365.8 (350)	182.9 (600)	365.8 (1200)	1321-3R500-B(1)	20	585		●		
		4	18.3 (60)	61.0 (200)	18.3 (60)	61.0 (200)	76.2 (250)	190.5 (625)	1321-3R500-B(1)	20	1170				
3B	870 (650)	2	18.3 (60)	91.4 (300)	18.3 (60)	91.4 (300)	152.4 (500)	274.3 (900)	1321-3R850-B(2)	20	960				
		4	18.3 (60)	61.0 (200)	18.3 (60)	61.0 (200)	53.3 (175)	137.2 (450)	1321-3R850-B(2)	20	1920				
3B	1275 (955)	2	18.3 (60)	83.8 (275)	18.3 (60)	83.8 (275)	137.2 (450)	274.3 (900)	2 x 1321-3R600-B(3)	20	720				

(1) Requires two parallel cables.

(2) Requires three parallel cables.

(3) Requires four parallel cables.

PowerFlex 700L with 700VC Control, 690V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution		Reactor Only		Reactor + Damping Resistor		Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1488V	1850V	1488V	1850V	1488V	1850V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
3A	475 (355)	2	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	228.6 (750)	304.8 (1000)	1321-3R500-C(1)	20	960	None			
		4	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	76.2 (250)	121.9 (400)	1321-3R500-C(1)	20	1920				
3B	881 (657)	2	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	182.9 (600)	228.6 (750)	1321-3R850-C(2)	20	1290				
		4	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	76.2 (250)	121.9 (400)	1321-3R850-C(2)	20	2580				
3B	1315 (980)	2	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	182.9 (600)	228.6 (750)	2 x 1321-3R600-C(3)	20	840				

(1) Requires two parallel cables.

(2) Requires three parallel cables.

(3) Requires four parallel cables.

PowerFlex 700L with 700S Control, 400V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution				Reactor Only				Reactor + Damping Resistor				Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
2	268 (200)	2	18.3 (60)	68.6 (225)	99.1 (325)	167.6 (550)	36.6 (120)	68.6 (225)	274.3 (900)	335.3 (1100)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	1321-3R400-B(1)	20	495		●		
		4	18.3 (60)	68.6 (225)	99.1 (325)	167.6 (550)	36.6 (120)	68.6 (225)	274.3 (900)	335.3 (1100)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	1321-3R400-B(1)	20	990				
3A	500 (370)	2	18.3 (60)	68.6 (225)	99.1 (325)	167.6 (550)	36.6 (120)	68.6 (225)	274.3 (900)	335.3 (1100)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	1321-3R750-B(1)	20	735		●		
		4	18.3 (60)	68.6 (225)	99.1 (325)	167.6 (550)	36.6 (120)	68.6 (225)	274.3 (900)	335.3 (1100)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	1321-3R750-B(1)	20	1470				
3B	960 (715)	2	12.2 (40)	68.6 (225)	99.1 (325)	167.6 (550)	36.6 (120)	68.6 (225)	274.3 (900)	335.3 (1100)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	2 x 1321-3R600-B(2)	20	525				
		4	12.2 (40)	68.6 (225)	99.1 (325)	167.6 (550)	36.6 (120)	68.6 (225)	274.3 (900)	335.3 (1100)	152.4 (500)	274.3 (900)	365.8 (1200)	365.8 (1200)	2 x 1321-3R600-B(2)	20	1050				

(1) Requires two parallel cables.

(2) Requires four parallel cables.

PowerFlex 700L with 700S Control, 480V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution				Reactor Only				Reactor + Damping Resistor				Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	1000V	1200V	1488V	1600V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
2	300 (224)	2	12.2 (40)	30.5 (100)	61.0 (200)	121.9 (400)	12.2 (40)	45.7 (150)	61.0 (200)	121.9 (400)	61.0 (200)	213.4 (700)	304.8 (1000)	365.8 (1200)	1321-3R400-B(1)	20	495		●		
		4	12.2 (40)	30.5 (100)	61.0 (200)	121.9 (400)	12.2 (40)	45.7 (150)	61.0 (200)	121.9 (400)	61.0 (200)	213.4 (700)	304.8 (1000)	365.8 (1200)	1321-3R400-B(1)	20	990				
3A	600 (445)	2	12.2 (40)	30.5 (100)	61.0 (200)	121.9 (400)	12.2 (40)	45.7 (150)	61.0 (200)	121.9 (400)	61.0 (200)	213.4 (700)	304.8 (1000)	365.8 (1200)	1321-3R750-B(1)	20	735		●		
		4	12.2 (40)	30.5 (100)	61.0 (200)	121.9 (400)	12.2 (40)	45.7 (150)	61.0 (200)	121.9 (400)	61.0 (200)	213.4 (700)	304.8 (1000)	365.8 (1200)	1321-3R750-B(1)	20	1470				
3B	1150 (860)	2	12.2 (40)	30.5 (100)	61.0 (200)	121.9 (400)	12.2 (40)	45.7 (150)	61.0 (200)	121.9 (400)	45.7 (150)	152.4 (500)	304.8 (1000)	365.8 (1200)	2 x 1321-3R600-B(2)	20	525				
		4	12.2 (40)	30.5 (100)	61.0 (200)	121.9 (400)	12.2 (40)	45.7 (150)	61.0 (200)	121.9 (400)	45.7 (150)	152.4 (500)	304.8 (1000)	365.8 (1200)	2 x 1321-3R600-B(2)	20	1050				

(1) Requires two parallel cables.

(2) Requires four parallel cables.

PowerFlex 700L with 700S Control, 600V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution		Reactor Only		Reactor + Damping Resistor		Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1488V	1850V	1488V	1850V	1488V	1850V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
3A	465 (345)	2	18.3 (60)	76.2 (250)	18.3 (60)	76.2 (250)	182.9 (600)	304.8 (1000)	1321-3R500-B(1)	20	585		●		
		4	18.3 (60)	76.2 (250)	18.3 (60)	76.2 (250)	182.9 (600)	304.8 (1000)	1321-3R500-B(1)	20	1170				
3B	870 (650)	2	18.3 (60)	61.0 (200)	18.3 (60)	61.0 (200)	152.4 (500)	228.6 (750)	1321-3R850-B(2)	20	960				
		4	18.3 (60)	61.0 (200)	18.3 (60)	61.0 (200)	152.4 (500)	228.6 (750)	1321-3R850-B(2)	20	1920				
3B	1275 (955)	2	12.2 (40)	45.7 (150)	12.2 (40)	45.7 (150)	121.9 (400)	228.6 (750)	2 x 1321-3R600-B(3)	20	720				

(1) Requires two parallel cables.

(2) Requires three parallel cables.

(3) Requires four parallel cables.

PowerFlex 700L with 700S Control, 690V Shielded/Unshielded Cable - *Meters (Feet)*

Drive			No Solution		Reactor Only		Reactor + Damping Resistor		Reactor	Resistor		Available Options			
Frame	HP (kW)	kHz	1488V	1850V	1488V	1850V	1488V	1850V	Cat. No.	Ohms	Watts	TFA1	TFB2	RWR2	RWC
3A	475 (355)	2	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	228.6 (750)	304.8 (1000)	1321-3R500-C(1)	20	960	None			
		4	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	182.9 (600)	228.6 (750)	1321-3R500-C(1)	20	1920				
3B	881 (657)	2	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	182.9 (600)	228.6 (750)	1321-3R850-C(2)	20	1290				
		4	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	182.9 (600)	228.6 (750)	1321-3R850-C(2)	20	2580				
3B	1315 (980)	2	24.4 (80)	45.7 (150)	24.4 (80)	45.7 (150)	182.9 (600)	228.6 (750)	2 x 1321-3R600-C(3)	20	840				

(1) Requires two parallel cables.

(2) Requires three parallel cables.

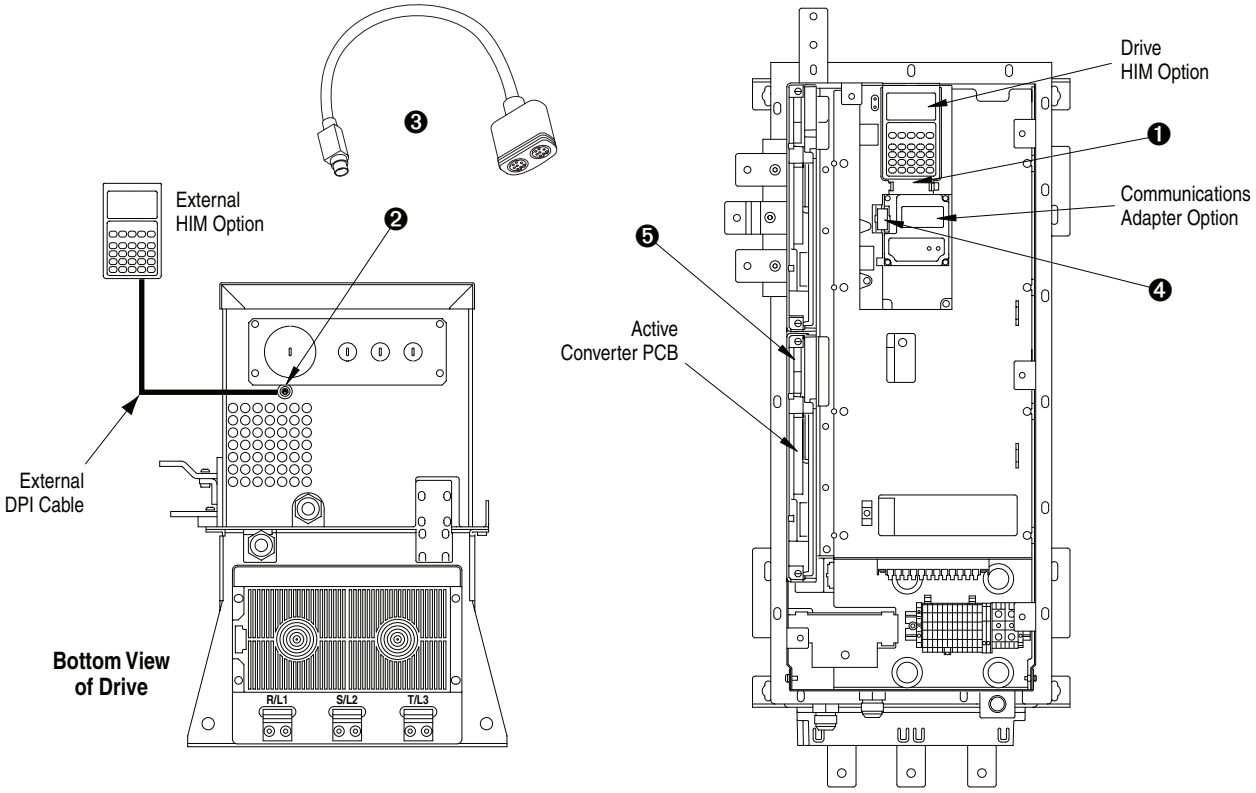
(3) Requires four parallel cables.

DPI Connections

Frame 2

Drive Connection Points

The PowerFlex 700L Frame 2 drive provides a number of cable connection points as shown in the drawing below. If an additional external HIM is required for the application, the HIM can be connected to the DPI port on the bottom of the drive. Only one additional external HIM device may be connected. The use of two external HIM devices is not supported. If multiple external HIM devices are required, then install a user-supplied splitter cable or splitter box.



Item	Connector	Description
❶	DPI Port 1	HIM connection when installed in the drive.
❷	DPI Port 2	Cable connection for handheld and remote options.
❸	DPI Port 3 or 2	Splitter cable connection to DPI Port 2 provides additional port.
❹	DPI Port 5	Cable connection for communications adapter.
❺	DPI Port 6	Internal DPI connection to Active Converter pcb.

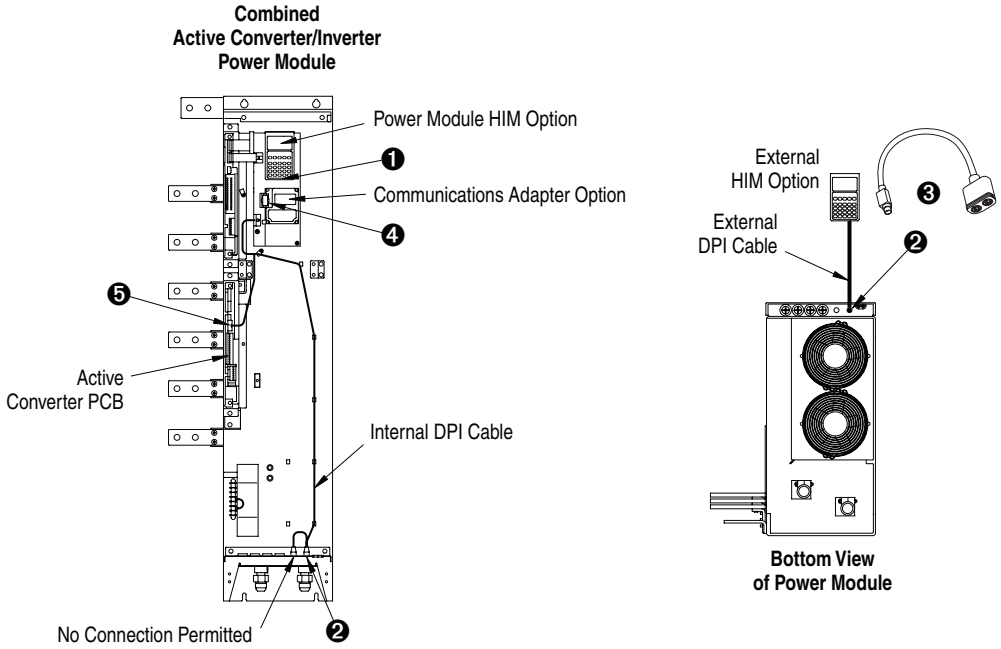
External Door-Mounted HIM Connection (optional)

For a Frame 2 drive installed in a user-supplied enclosure, an optional external door-mounted HIM may be connected as an alternative to the external HIM option. The cable supplied with the door-mount HIM option kit connects to the DPI port on the bottom of the drive (see drawing above). For additional installation information, refer to the instructions provided with the door-mount HIM option kit.

Frame 3A

Drive Connection Points

The PowerFlex 700L provides a number of cable connection points as shown in the drawings below. If an additional external HIM is required for the application, the HIM can be connected to the DPI port on the bottom of the Power Module. Only one additional external HIM device may be connected. The use of two external HIM devices is not supported. If multiple external HIM devices are required, then install a user-supplied splitter cable or splitter box.



Item	Connector	Description
1	DPI Port 1	HIM connection when installed in Power Module.
2	DPI Port 2	Cable connection for handheld and remote options.
3	DPI Port 3 or 2	Splitter cable connected to DPI Port 2 provides an additional port.
4	DPI Port 5	Cable connection for communications adapter.
5	DPI Port 6	Internal DPI connection to Active Converter PCB.

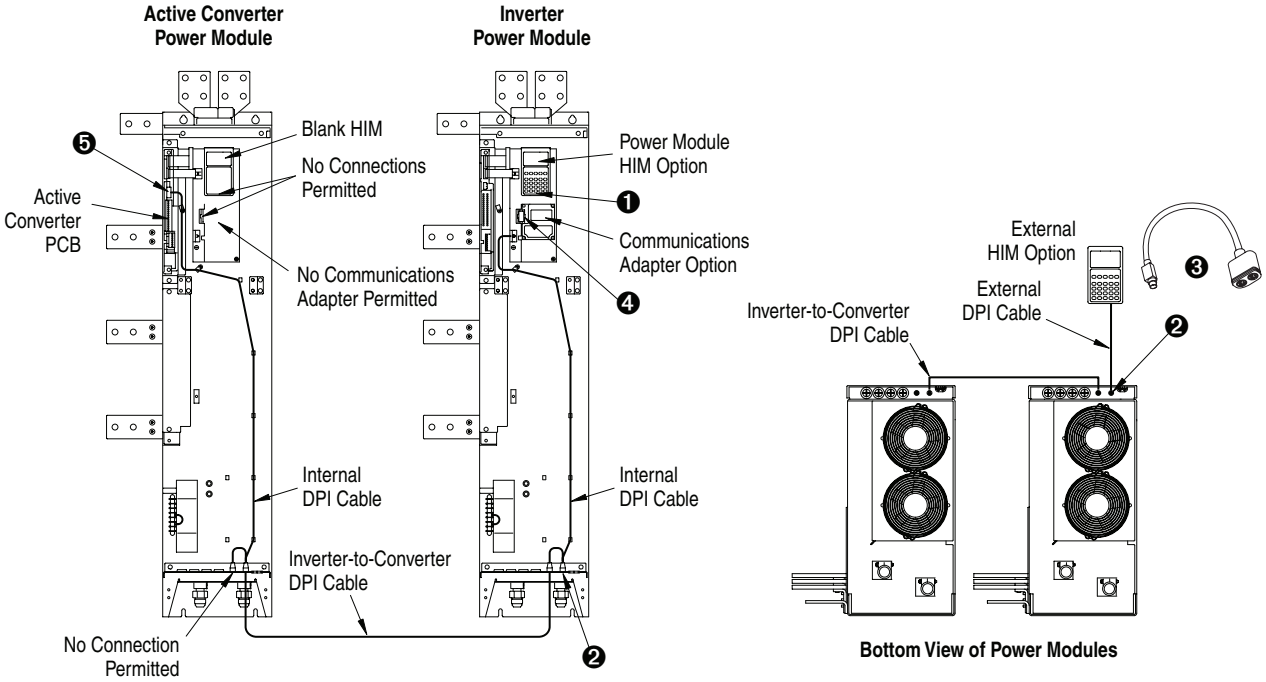
External Door-Mounted HIM Connection (optional)

For complete drives, the door-mounted HIM is standard equipment. It is located in the door mount bezel on the door of the Power Module Bay.

Frame 3B

Drive Connection Points

The PowerFlex 700L provides a number of cable connection points as shown in the drawings below. If an additional external HIM is required for the application, the HIM can be connected to the DPI port on the bottom of the Power Module. Only one additional external HIM device may be connected. The use of two external HIM devices is not supported. If multiple external HIM devices are required, then install a user-supplied splitter cable or splitter box.



Item	Connector	Description
❶	DPI Port 1	HIM connection when installed in Power Module.
❷	DPI Port 2	Cable connection for handheld and remote options.
❸	DPI Port 3 or 2	Splitter cable connected to DPI Port 2 provides an additional port.
❹	DPI Port 5	Cable connection for communications adapter.
❺	DPI Port 6	Internal DPI connection to Active Converter PCB.

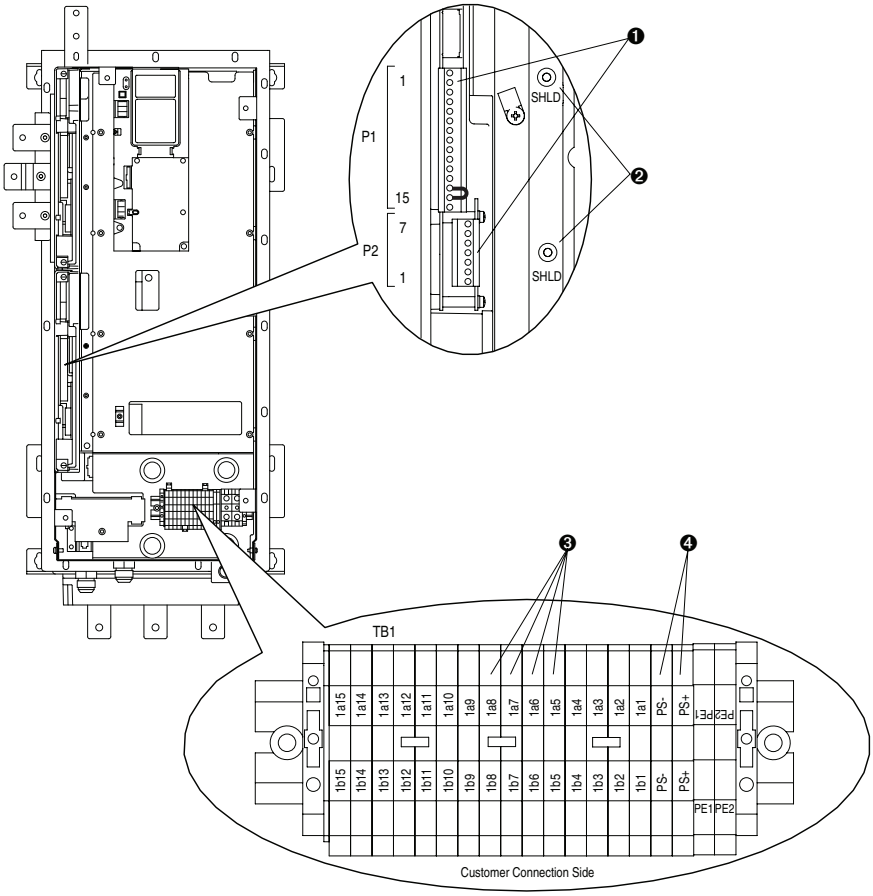
External Door-Mounted HIM Connection (optional)

For complete drives, the door-mounted HIM is standard equipment. It is located in the door mount bezel on the door of the Power Module Bay.

Control Connections

Frame 2

Frame 2 Control Terminal Locations



Frame 2 Control Terminal Specifications

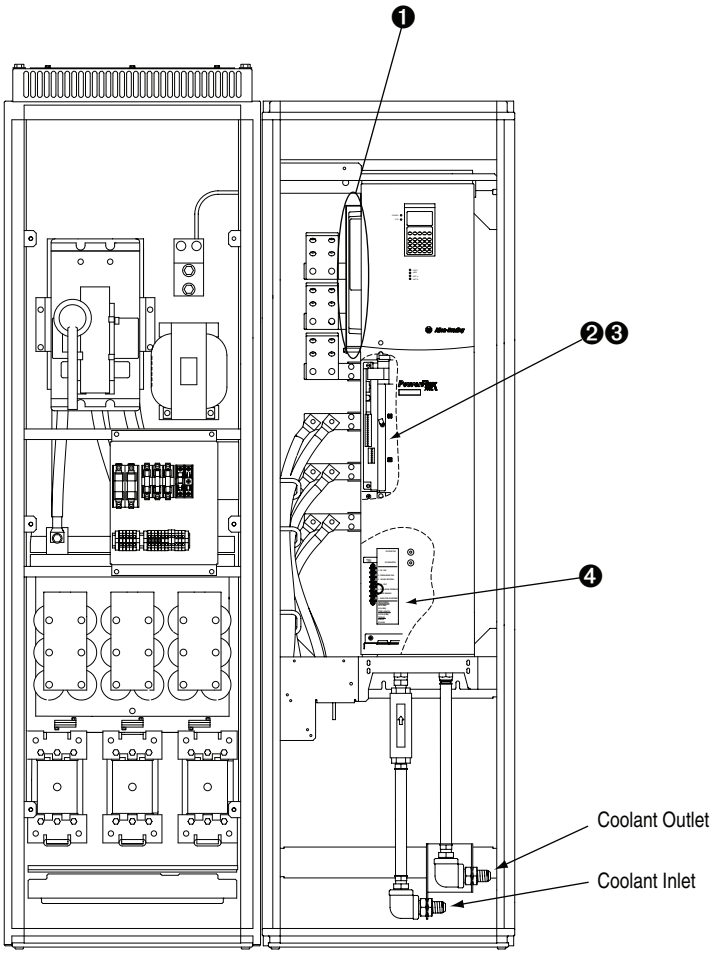
Item	Name	Description	Wire Size Range(1) Maximum	Wire Size Range(1) Minimum	Recommended Tightening Torque (±10%)	Wire Strip Length
❶	PowerFlex 700 Vector Control or PowerFlex 700S Phase II Control Cassette Terminal Blocks	See *PowerFlex 700 Series B Tech Data (publication 20B-TD001)* or *PowerFlex 700S Tech Data (publication 20D-TD002)* respectively for details.				
❷	Active Converter Cassette Terminal Blocks — P1 & P2	Active Converter AC power and control wiring	3.3 mm² (#12 AWG)	0.3 mm² (#22 AWG)	0.8 N•m (7 lb•in)	8 mm (0.31 in.)
❸	SHLD Terminal	Terminating point for control wiring shields on the drive	2.1 mm² (#14 AWG)	0.3 mm² (#22 AWG)	1.4 N•m (12 lb•in)	10 mm (0.39 in.)
❹	Terminal Block — TB1 1b 5: +12/+24V Cooling Loop 1b 6: Cooling Loop Return	Drive control wiring: Output dry contact (12V dc/24V dc, 2 Amps max.) indicating the drive is powered and has completed precharge.	4.0 mm² (#10 AWG)	0.2 mm² (#24 AWG)	0.9 N•m (8 lb•in)	8 mm (0.31 in.)
	1b 7: +24V (digin)	Drive-supplied +24V dc				
	1b 8: Gate Enable	Enables the firing of the IGBTs. Factory-installed jumper from terminal 1b 7 to terminal 1b 8 allows firing of the IGBTs.				
❺	PS- Terminal PS+ Terminal	300V dc Auxiliary Control voltage	4.0 mm² (#12 AWG)	0.5 mm² (#22 AWG)	0.6 N•m (5.3 lb•in)	10 mm (0.39 in.)

(1) Maximum/minimum sizes that the terminals will accept - these are not recommendations.

Frame 3

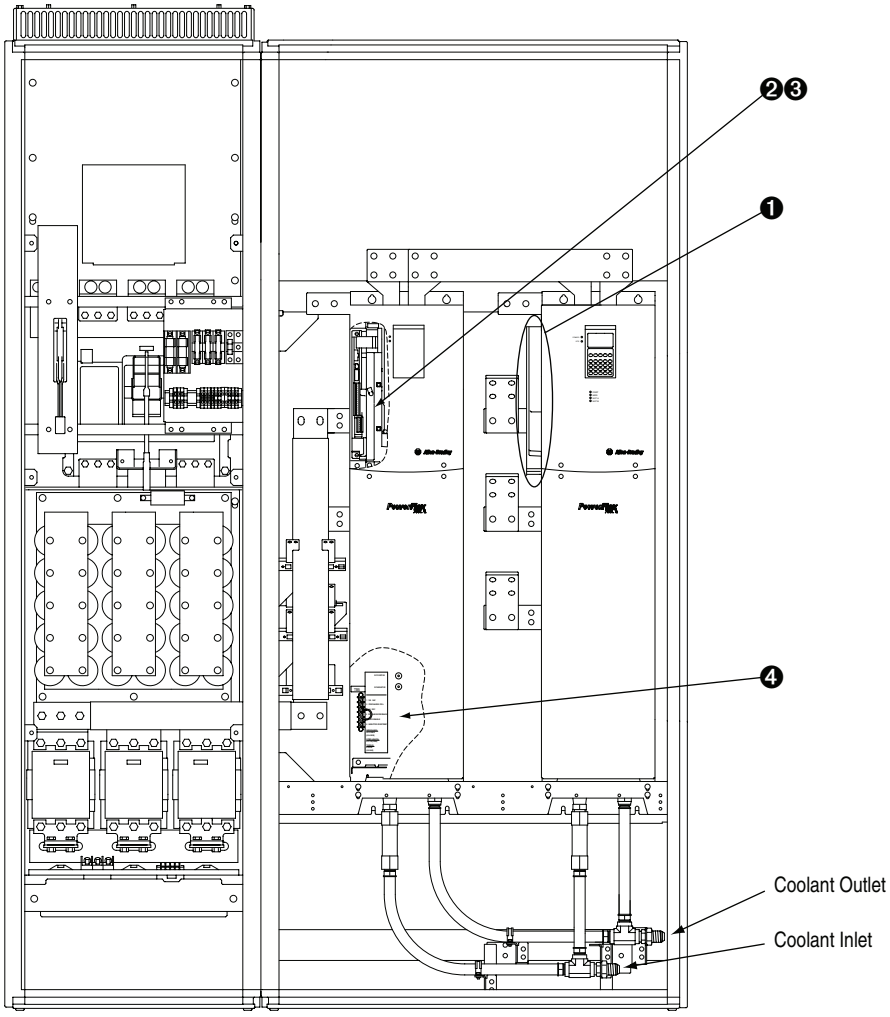
Frame 3A Control Terminal Locations

(Drive shown with doors removed)



Frame 3B Control Terminal Locations

(Drive shown with doors removed)



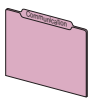
Frame 3A/3B Control Terminal Specifications

Item	Name	Description	Wire Size Range(1)		Recommended Tightening Torque (±10%)	Wire Strip Length	Wire Terminal
			Maximum	Minimum			
❶	PowerFlex 700 Vector Control or PowerFlex 700S Phase II Control Cassette Terminal Blocks	See *PowerFlex 700 Series B Tech Data (publication 20B-TD001)* or *PowerFlex 700S Tech Data (publication 20D-TD002)* respectively for details.					
❷	Active Converter Cassette Terminal Blocks — P1 & P2	Active Converter AC power and control wiring	3.3 mm^2 (#12 AWG)	0.3 mm^2 (#22 AWG)	0.8 N•m (7 lb•in)	8 mm (0.31 in.)	not applicable
❸	SHLD Terminal	Terminating point for control wiring shields on Power Module	2.1 mm^2 (#14 AWG)	0.3 mm^2 (#22 AWG)	1.4 N•m (12 lb•in)	10 mm (0.39 in.)	not applicable
❹	Terminal Blocks — TB5 and TB6	Power Module control wiring	4.0 mm^2 (#10 AWG)	0.2 mm^2 (#24 AWG)	1.4 N•m (12 lb•in)	8 mm (0.31 in.)	not applicable

(1) Maximum/minimum sizes that the terminals will accept - these are not recommendations.

Control Highlights

Active Converter Control

File	Group	Parameters								
Monitor	Current	Rated Amps	001	Input Current T	004	Reactive Current	007			
		Input Current R	002	Ground Current	005	I Imbalance	008			
		Input Current S	003	Active Current	006	IT Overload	009			
	Voltage	Rated Volts	010	Input Voltage ST	012	DcLink Voltage	014	V Imbalance	016	
		Input Voltage RS	011	Input Voltage TR	013	DcLink Ripple	015			
	Power & Time	Rated Power	020	Regen kWh	023	Life Run Time	026			
		AC Line kW	021	Lifetime kWh	024	Life Power Time	027			
		Motoring kWh	022	Elapsed Run Time	025	Life Pwr Cycles	028			
	Temperature	Ambient Temp	030	IGBT Base Temp	031	IGBT Junct Temp	032			
	Frequency	Line Frequency	040	Max Line Freq	042	Change Line Freq	044			
		Min Line Freq	041	Min Max Persist	043					
Command	Start/Stop	Start Config	050	Option Select	051	Manual Control	052	Turn Off Delay	053	
	Setpoints	DcLink Reference	060	Extern Cml Ref	062	Modulation Freq	064			
		kVAR Reference	061	Modulation Index	063					
	Data Exchange	Converter Control	070	Converter Status	071	Converter Min Vdc	072	Converter Fault	073	
Limit Config	Current	Active I Lmt	100	Reactive RateLmt	102	I Imbalance Time	104			
		Active OL I Lmt	101	I Imbalance Lmt	103	Regen I Lmt	105			
	AC Line Voltage	Ride Through Ena	110	Low Vac Lmt	112	High Vac Lmt	114	V Imbalance Lmt	116	
		Ride Through Sec	111	Low Vac Time	113	High Vac Time	115	V Imbalance Time	117	
	Temperature	Ambnt Temp Alrm	120	Base Temp Alrm	122	Junct Temp Alrm	124	CldPlt Temp Alrm	126	
		Ambnt Temp Trip	121	Base Temp Trip	123	Junct Temp Trip	125			
	Frequency	PWM Frequency	130	AC Low Freq Time	132	AC High Freq Time	134			
		AC Low Freq Lmt	131	AC High Freq Lmt	133	AC Maximum dF/dt	135			
Dynamic Control	Current Loop	Reduce Ilmt Sel	150	CML Bandwidth	153	CML Kp	156	Reactive I Cmd	159	
		Active I Cmd	151	CML Damping	154	PF Bandwidth	157			
		Inductance	152	CML Ki	155	Reactive I Lmt	158			
	Voltage Loop	Voltage Loop Sel	160	VML Bandwidth	163	VML Kp	166	Parallel Config	169	
		DcLink Command	161	VML Damping	164	VML Kf	167	Bus Capacitance	170	
		Capacitance	162	VML Ki	165	VML Reset Level	168			
Utility	Drive Memory	Param Access Lvl	196	Reset Meters	200	Drive Checksum	203	Password	205	
		Reset to Defaults	197	Language	201	Control SW Ver	204			
	Diagnostics	Alarm Status	211	Fault Amps T	223	Fault VoltsTR	228	Testpoint 2 Sel	236	
		Start Inhibit	214	Fault Amps Q	224	Fault Volts Vdc	229	Testpoint 2 Data	237	
		Fault Frequency	220	Fault Amps D	225	Fault Base Temp	230			
		Fault Amps R	221	Fault Volts RS	226	Testpoint 1 Sel	234			
		Fault Amps S	222	Fault Volts ST	227	Testpoint 1 Data	235			
	Fault Queue	Fault Config	238	Fault 1 Code	243	Fault 2 Time	246	Fault 4 Code	249	
		Fault Clear	239	Fault 1 Time	244	Fault 3 Code	247	Fault 4 Time	250	
		Power Up Marker	242	Fault 2 Code	245	Fault 3 Time	248	Alarm Config	260	
Communication 	Datalinks	Data In A1	300	Data In C1	304	Data Out A1	310	Data Out C1	314	
		Data In A2	301	Data In C2	305	Data Out A2	311	Data Out C2	315	
		Data In B1	302	Data In D1	306	Data Out B1	312	Data Out D1	316	
		Data In B2	303	Data In D2	307	Data Out B2	313	Data Out D2	317	
	DPI Status	Connect Status	320	CS Msg Tx Cnt	323	PC Msg Rx Cnt	326	CAN Bus Off Cnt	329	
		DPI Error Out	321	CS Timeout Cnt	324	PC Msg Tx Cnt	327			
		CS Msg Rx Cnt	322	CS Msg Bad Cnt	325	PC Timeout Cnt	328			
	Masks & Owners	Logic Mask	340	Fault Clr Mask	342	Start Owner	344			
		Start Mask	341	Stop Owner	343	Fault Clr Owner	345			
	Security	Port Mask Act	346	Write Mask Cfg	347	Write Mask Act	348	Logic Mask Act	349	
Inputs & Outputs	Mux'ed Temps	IGBT NTC Temp1	330	IGBT NTC Temp4	333	IGBT NTC Temp6	336	Coldplate Temp2	339	
		IGBT NTC Temp2	331	Coldplate Temp1	334	IGBT NTC Temp7	337			
		IGBT NTC Temp3	332	IGBT NTC Temp5	335	IGBT NTC Temp8	338			
	Digital Inputs	Dig In Status	350	Dig In Frc Mask	351	Dig In Frc Data	352			
	Digital Outputs	Dig Out Status	360	Dig Out Frc Mask	361	Dig Out Frc Data	362			

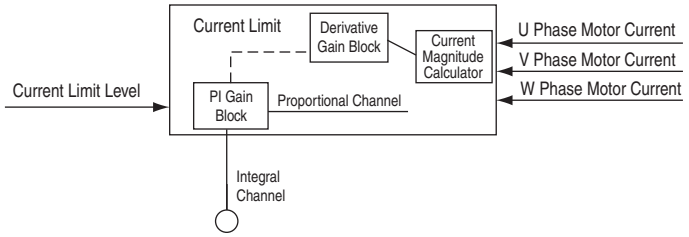
PowerFlex 700 Vector Control

File	Group	Parameters							
Monitor	Metering	Output Freq	001	Output Current	003	Elapsed MWh	009	Analog In2 Value	017
		Commanded Speed	002	Torque Current	004	Elapsed Run Time	010	Elapsed kWh	014
		Ramped Speed	022	Flux Current	005	MOP Reference	011	PTC HW Value	018
		Speed Reference	023	Output Voltage	006	DC Bus Voltage	012	Spd Fdbk No Filt	021
		Commanded Torque	024	Output Power	007	DC Bus Memory	013		
		Speed Feedback	025	Output Powr Fctr	008	Analog In1 Value	016		
	Drive Data	Rated kW	026	Rated Volts	027	Rated Amps	028	Control SW Ver	029
Motor Control	Motor Data	Motor Type	040	Motor NP Hertz	043	Mtr NP Pwr Units	046	Motor Poles	049
		Motor NP Volts	041	Motor NP RPM	044	Motor OL Hertz	047		
		Motor NP FLA	042	Motor NP Power	045	Motor OL Factor	048		
	Torq Attributes	Motor Cntl Sel	053	IR Voltage Drop	062	Torq Ref A Div	430	Neg Torque Limit	437
		Maximum Voltage	054	Flux Current Ref	063	Torque Ref B Sel	431	Control Status	440
		Maximum Freq	055	IXo Voltage Drop	064	Torque Ref B Hi	432	Mtr Tor Cur Ref	441
		Compensation	056	Autotune Torque	066	Torque Ref B Lo	433		
		Flux Up Mode	057	Inertia Autotune	067	Torq Ref B Mult	434		
		Flux Up Time	058	Torque Ref A Sel	427	Torque Setpoint 1	435		
		SV Boost Filter	059	Torque Ref A Hi	428	Torque Setpoint 2	438		
		Autotune	061	Torque Ref A Lo	429	Pos Torque Limit	436		
	Volts per Hertz	Start/Acc Boost	069	Run Boost	070	Break Voltage	071	Break Frequency	072
	Speed Feedback	Motor Fdbk Type	412	Encoder Speed	415	Notch Filter K	420	Encoder Z Chan	423
		Encoder PPR	413	Fdbk Filter Sel	416	Marker Pulse	421		
		Enc Position Fdbk	414	Notch Filter Freq	419	Pulse In Scale	422		
Speed Command	Spd Mode & Limits	Speed Units	079	Maximum Speed	082	Skip Frequency 2	085	Speed/Torque Mod	088
		Feedback Select	080	Overspeed Limit	083	Skip Frequency 3	086	Rev Speed Limit	454
		Minimum Speed	081	Skip Frequency 1	084	Skip Freq Band	087		
	Speed References	Speed Ref A Sel	090	Speed Ref B Sel	093	TB Man Ref Sel	096	Pulse Input Ref	099
		Speed Ref A Hi	091	Speed Ref B Hi	094	TB Man Ref Hi	097		
		Speed Ref A Lo	092	Speed Ref B Lo	095	TB Man Ref Lo	098		
	Discrete Speeds	Jog Speed 1	100	Preset Speed 3	103	Preset Speed 6	106		
		Preset Speed 1	101	Preset Speed 4	104	Preset Speed 7	107		
		Preset Speed 2	102	Preset Speed 5	105	Jog Speed 2	108		
	Speed Trim	Trim In Select	117	Trim Hi	119	Trim % Setpoint	116		
		Trim Out Select	118	Trim Lo	120				
	Slip Comp	Slip RPM @ FLA	121	Slip Comp Gain	122	Slip RPM Meter	123		
	Process PI	PI Configuration	124	PI Prop Gain	130	PI Fdback Meter	136	PI Feedback Lo	463
		PI Control	125	PI Lower Limit	131	PI Error Meter	137	PI BW Filter	139
		PI Reference Sel	126	PI Upper Limit	132	PI Output Meter	138	PI Deriv Time	459
		PI Setpoint	127	PI Preload	133	PI Reference Hi	460	PI Output Gain	464
		PI Feedback Sel	128	PI Status	134	PI Reference Lo	461		
		PI Integral Time	129	PI Ref Meter	135	PI Feedback Hi	462		
	Speed Regulator	Ki Speed Loop	445	Kf Speed Loop	447	Total Inertia	450		
		Kp Speed Loop	446	Speed Desired BW	449	Speed Loop Meter	451		
Dynamic Control	Ramp Rates	Accel Time 1	140	Decel Time 1	142	S Curve %	146		
		Accel Time 2	141	Decel Time 2	143				
	Load Limits	Current Lmt Sel	147	Current Lmt Gain	149	PWM Frequency	151	Regen Power Limit	153
		Current Lmt Val	148	Drive OL Mode	150	Droop RPM @ FLA	152	Current Rate Limit	154
	Stop/Brake Modes	Stop Mode A	155	DC Brake Time	159	DB Resistor Type	163	DB While Stopped	145
		Stop Mode B	156	Bus Reg Ki	160	Bus Reg Kp	164		
		DC Brk Lvl Sel	157	Bus Reg Mode A	161	Bus Reg Kd	165		
		DC Brake Level	158	Bus Reg Mode B	162	Flux Braking	166		
	Restart Modes	Start At PowerUp	168	Auto Rstrt Tries	174	Sleep-Wake Ref	179	Sleep Level	182
		Flying Start En	169	Auto Rstrt Delay	175	Wake Level	180	Sleep Time	183
		Flying StartGain	170	Sleep-Wake Mode	178	Wake Time	181	Powerup Delay	167
	Power Loss	Power Loss Mode	184	Power Loss Level	186	Load Loss Time	188	Gnd Warn Level	177
		Power Loss Time	185	Load Loss Level	187	Shear Pin Time	189		

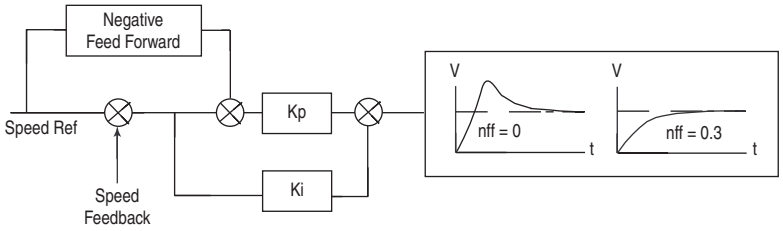
File	Group	Parameters							
Utility	Direction Config	Direction Mode	190						
	HIM Ref Config	Save HIM Ref	192	Man Ref Preload	193				
	MOP Config	Save MOP Ref	194	MOP Rate	195				
	Drive Memory	Param Access Lvl	196	Save To User Set	199	Voltage Class	202	Dyn UserSet Sel	205
		Reset To Defalts	197	Reset Meters	200	Drive Checksum	203	Dyn UserSet Actv	206
		Load Frm Usr Set	198	Language	201	Dyn UserSet Cnfg	204		
	Diagnostics	Drive Status 1	209	Last Stop Source	215	Fault Speed	224	Alarm 2 @ Fault	230
		Drive Status 2	210	Dig In Status	216	Fault Amps	225	Testpoint 1 Sel	234
		Drive Alarm 1	211	Dig Out Status	217	Fault Bus Volts	226	Testpoint 2 Sel	236
		Drive Alarm 2	212	Drive Temp	218	Status 1 @ Fault	227	Testpoint 1 Data	235
		Speed Ref Source	213	Drive OL Count	219	Status 2 @ Fault	228	Testpoint 2 Data	237
		Start Inhibits	214	Motor OL Count	220	Alarm 1 @ Fault	229	Mtr OL Trip Time	221
	Faults	Fault Config 1	238	Fault 1 Time	244	Fault 4 Code	249	Fault 6 Time	254
		Fault Clear	240	Fault 2 Code	245	Fault 4 Time	250	Fault 7 Code	255
		Fault Clear Mode	241	Fault 2 Time	246	Fault 5 Code	251	Fault 7 Time	256
		Power Up Marker	242	Fault 3 Code	247	Fault 5 Time	252	Fault 8 Code	257
		Fault 1 Code	243	Fault 3 Time	248	Fault 6 Code	253	Fault 8 Time	258
	Alarms	Alarm Config 1	259	Alarm 2 Code	263	Alarm 5 Code	266	Alarm 8 Code	269
		Alarm Clear	261	Alarm 3 Code	264	Alarm 6 Code	267		
		Alarm 1 Code	262	Alarm 4 Code	265	Alarm 7 Code	268		
	Scaled Blocks	Scale1 In Value	476	Scale2 In Value	482	Scale3 In Value	488	Scale4 In Value	494
		Scale1 In Hi	477	Scale2 In Hi	483	Scale3 In Hi	489	Scale4 In Hi	495
		Scale1 In Lo	478	Scale2 In Lo	484	Scale3 In Lo	490	Scale4 In Lo	496
		Scale1 Out Hi	479	Scale2 Out Hi	485	Scale3 Out Hi	491	Scale4 Out Hi	497
		Scale1 Out Lo	480	Scale2 Out Lo	486	Scale3 Out Lo	492	Scale4 Out Lo	498
		Scale1 Out Value	481	Scale2 Out Value	487	Scale3 Out Value	493	Scale4 Out Value	499
Communication	Comm Control	DPI Baud Rate	270	Drive Ref Rslt	272	DPI Port Sel	274	DPI Ref Select	298
		Drive Logic Rslt	271	Drive Ramp Rslt	273	DPI Port Value	275	DPI Fdbk Select	299
	Masks & Owners	Logic Mask	276	Accel Mask	281	Stop Owner	288	Accel Owner	293
		Start Mask	277	Decel Mask	282	Start Owner	289	Decel Owner	294
		Jog Mask	278	Fault Clr Mask	283	Jog Owner	290	Fault Clr Owner	295
		Direction Mask	279	MOP Mask	284	Direction Owner	291	MOP Owner	296
		Reference Mask	280	Local Mask	285	Reference Owner	292	Local Owner	297
	Datalinks	Data In A1	300	Data In C1	304	Data Out A1	310	Data Out C1	314
		Data In A2	301	Data In C2	305	Data Out A2	311	Data Out C2	315
		Data In B1	302	Data In D1	306	Data Out B1	312	Data Out D1	316
		Data In B2	303	Data In D2	307	Data Out B2	313	Data Out D2	317
	Security	Port Mask Act	595	Write Mask Act	597	Logic Mask Act	598		
		Write Mask Cfg	596	Logic Mask	276				
Inputs & Outputs	Analog Inputs	Anlg In Config	320	Analog In1 Hi	322	Analog In1 Loss	324	Analog In2 Lo	326
		Anlg In Sqr Root	321	Analog In1 Lo	323	Analog In2 Hi	325	Analog In2 Loss	327
	Analog Outputs	Anlg Out Config	340	Analog Out1 Hi	343	Analog Out2 Hi	346	Anlg Out2 Scale	355
		Anlg Out Absolut	341	Analog Out1 Lo	344	Analog Out2 Lo	347	Anlg1 Out Setpt	377
		Analog Out1 Sel	342	Analog Out2 Sel	345	Anlg Out1 Scale	354	Anlg2 Out Setpt	378
	Digital Inputs	Digital In1 Sel	361	Digital In3 Sel	363	Digital In5 Sel	365		
		Digital In2 Sel	362	Digital In4 Sel	364	Digital In6 Sel	366		
	Digital Outputs	Dig Out Setpt	379	Dig Out1 OffTime	383	Dig Out2 OffTime	387	Dig Out3 OffTime	391
		Digital Out1 Sel	380	Digital Out2 Sel	384	Digital Out3 Sel	388	Dig Out Invert	392
		Dig Out1 Level	381	Dig Out2 Level	385	Dig Out3 Level	389	Dig Out Param	393
		Dig Out1 OnTime	382	Dig Out2 OnTime	386	Dig Out3 OnTime	390	Dig Out Mask	394

PowerFlex 700S Phase II Control

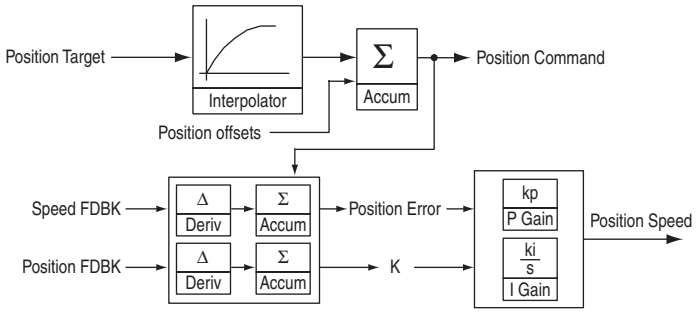
Digital Current Regulator outperforms older style analog regulators in speed, repeatability and drift.



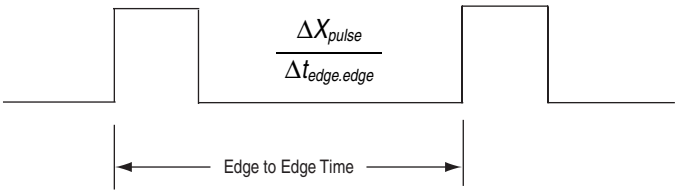
Negative Feed Forward reduces or eliminates overshoot during step speed changes. Helpful in preventing backup during stopping.



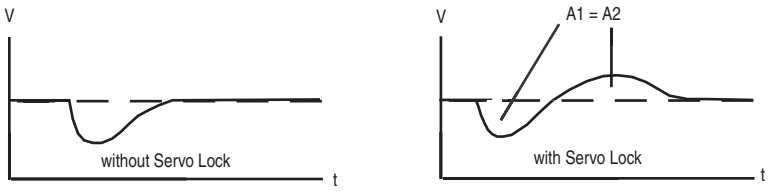
Coarse-to-Fine interpolation for **DriveLogix Motion**, direct positioning for precise control and point-to-point for indexing are all features of the **Integral Position Loop.** The loop easily handles applications such as simple indexing and electronic line shaft.



Advanced **Edge-to-Edge Algorithms** and pulse position averaging provides extremely accurate speed measurement and excellent performance at very low speed.

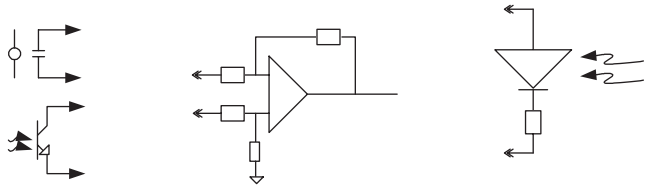


Servo Lock compensates for lost position during step loads to the velocity regulator. Offers optimum performance for draw applications and others.

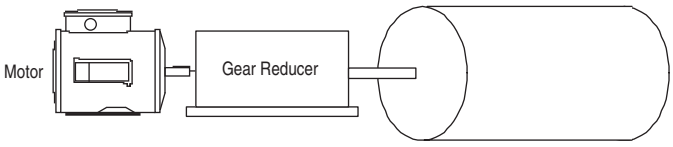


Velocity Response to Step Load

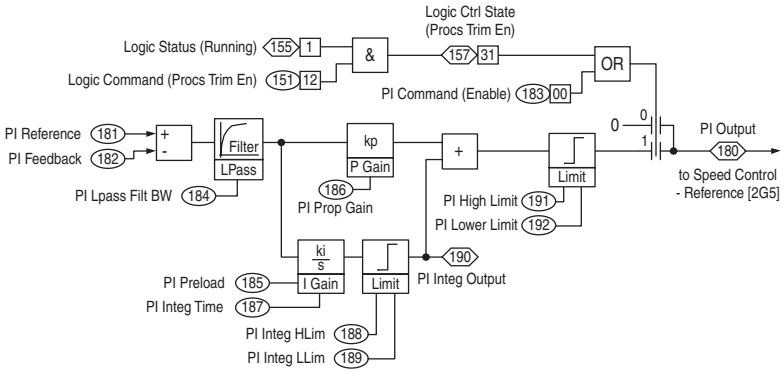
High Speed Analog & Digital I/O execute in 0.5 mSec or less to provide fast response and fast capture for registration information and position data. Output relays, optically isolated and differentially isolated I/O are supplied.



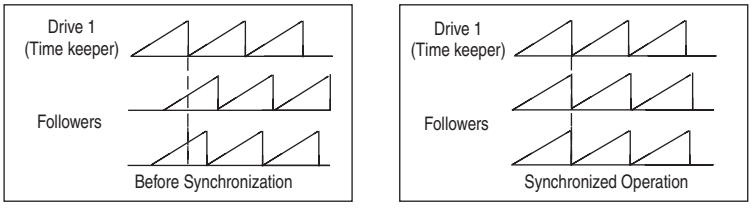
Inertia Adaptation stabilizes inertia disconnect due to gear boxes or flexible couplings. It also provides broadband resonance compensation, allowing up to 4 times improvement to speed regulator bandwidth.



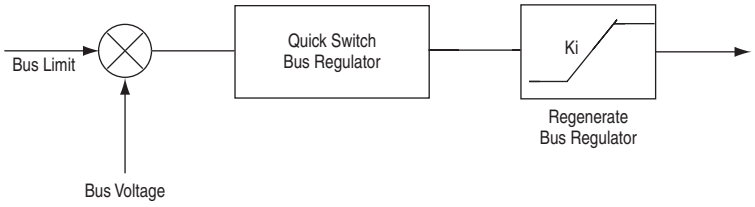
An **Enhanced Process Loop** executes six times faster than previous loops, providing greatly improved dynamic response in tension control applications.



The **Control Loops** within each drive are **Synchronized**. In addition, the control loops for all drives on SynchLink are synchronized within micro-seconds. This provides exceptional link coordination and tracking for critical applications.



The **Enhanced Bus Regulator** reacts four times faster than previous products, providing quicker stops without over-voltage issues and outstanding performance in other regenerative applications.



Standard Drive Specifications

Category	Specification		
		Frame 2	Frame 3A/3B
Agency Certification	c UL us	Listed to UL508C and CAN/CSA-C2.2 No. 14-05. UL Listing for Frame 2 is applicable up to 480V AC. UL Listing for Frame 3A and 3B is applicable up to 600V AC.	
	CE	Marked for all applicable European Directives(1) EMC Directive (89/336/EEC) EN 61800-3 Adjustable Speed electrical power drive systems Low Voltage Directive (73/23/EEC) EN 50178 Electronic Equipment for use in Power Installations	
	C N223	Certified to AS/NZS, 1997 Group 1, Class A.	
	These drives are also designed to meet the following specifications: NFPA 70 - US National Electrical Code NEMA ICS 3.1 - Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems. IEC 146 - International Electrical Code. CMAA Specification #70 (Crane Manufacturers of America Association)		

(1) Applied noise impulses may be counted in addition to the standard pulse train causing erroneously high [Pulse Freq] readings.

The following specifications, unless otherwise noted, pertain to PowerFlex 700L drives equipped with 700 Vector Control or 700S Phase II Control.

Category	Specification						
		Frame 2		Frame 3A/3B			
Protection		400V	480V	400V	480V	600V	690V
	AC Input Overvoltage Trip:	528V AC	528V AC	528V AC	528V AC	760V AC	760V AC
	AC Input Undervoltage Trip:	340V AC	340V AC	340V AC	340V AC	340V AC	340V AC
	Bus Overvoltage Trip:	815V DC	815V DC	815V DC	815V DC	1168V DC	1168V DC
	Bus Undervoltage Shutoff/Fault:	300V DC	300V DC	300V DC	300V DC	300V DC	300V DC
	Nominal Bus Voltage:	600V DC	700V DC	600V DC	700V DC	900V DC	1000V DC
	Heat Sink Thermistor:	Monitored by microprocessor overtemp trip					
	Drive Overcurrent Trip Software Overcurrent Trip: Hardware Overcurrent Trip:	 200% of rated current (typical) 220-300% of rated current (dependent on drive rating)					
	Line Transients:	Up to 6000 volts peak per IEEE C62.41-1991					
	Control Logic Noise Immunity:	Showering arc transients up to 1500V peak					
	Logic Control Ride-Thru Vector Control: 700S Phase II Control:	 0.5 seconds minimum, 2 seconds typical 0.25 seconds, drive not running					
	Ground Fault Trip:	Phase-to-ground on drive output					
	Short Circuit Trip:	Phase-to-phase on drive output					
Environment	Altitude:	1000 m (3280 ft.) at rated current. See Derating Guidelines on page 40 for operation above 1000 m (3280 ft.).					
	Maximum Surrounding Air Temperature w/o Derating: IP20, NEMA/UL Type 1:	 0 to 50°C (32 to 122°F)		 0 to 40°C (32 to 104°F)			
	Storage Temperature (all constructions):	–40 to 85°C (–40 to 185°F)					
	Atmosphere:	**Important:** Drive **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.					
	Relative Humidity:	5 to 95% non-condensing					
	Shock:	10G peak for 11 milliseconds duration (±1.0 ms)					
	Vibration:	0.152 mm (0.006 in.) displacement, 1G peak, 5.5 Hz					

Category	Specification		
		Frame 2	Frame 3A/3B
Electrical	Voltage Tolerance Vector Control: 700S Phase II Control:	For full power and operating range, see the *PowerFlex 700 Adjustable Frequency AC Drive — Series B User Manual (publication 20B-UM002), Appendix C.* For full power and operating range, see the *PowerFlex 700S High Performance AC Drive — Phase II Control User Manual (publication 20D-UM006), Appendix C.*	
	Input Frequency Tolerance:	27-93 Hz.	
	Input Phases:	Three-phase input provides full rating for all drives.	
	Displacement Power Factor:	0.98 across entire speed range.	
	Efficiency:	96.2% at rated amps, nominal line volts.	97.5% at rated amps, nominal line volts.
	Maximum Short Circuit Current Rating:	To match specified circuit breaker capability, ≤200,000 Amps	
	Actual Short Circuit Rating:	Determined by AIC rating of installed circuit breaker.	
	Motor Lead Lengths:	76 meters (250 feet) total	
Control	Method:	Sine coded PWM with programmable carrier frequency.	
	Carrier Frequency:	2, 4, or 8 kHz. Drive rating based on 4 kHz. See Derating Guidelines on page 40 for more information.	2 or 4 kHz. Drive rating based on 4 kHz.
	Output Voltage Range:	0 to rated motor voltage	
	Output Frequency Range Vector Control: 700S Phase II Control:	 0 to 420 Hz 0 to 350 Hz	
	Frequency Accuracy (Vector Control only) Digital Input: Analog Input:	 Within ± 0.01% of set output frequency. Within ± 0.4% of maximum output frequency	
	Frequency Control (Vector Control only):	Speed Regulation - w/Slip Compensation (Volts per Hertz Mode) 0.5% of base speed across 40:1 speed range 40:1 operating range 10 rad/sec bandwidth Speed Regulation - w/Slip Compensation (Sensorless Vector Mode) 0.5% of base speed across 80:1 speed range 80:1 operating range 20 rad/sec bandwidth	
	Speed Control Vector Control: 700S Phase II Control:	 Speed Regulation - without feedback (Vector Control Mode) 0.1% of base speed across 120:1 speed range 120:1 operating range 50 rad/sec bandwidth Speed Regulation - with feedback (Vector Control Mode) 0.001% of base speed across 120:1 speed range 1000:1 operating range 250 rad/sec bandwidth Speed Regulation - without feedback 0.1% of base speed across 120:1 speed range 120:1 operating range 50 rad/sec bandwidth Speed Regulation - with feedback 0.001% of base speed across 120:1 speed range 1000:1 operating range 740 rad/sec bandwidth	
	Torque Regulation Vector Control: 700S Phase II Control:	 Torque regulation without Feedback; ± 5%, 600 rad/sec bandwidth Torque regulation with Feedback; ± 2%, 2500 rad/sec bandwidth Torque regulation without Feedback; ± 10%, 600 rad/sec bandwidth Torque regulation with Feedback; ± 5%, 4400 rad/sec bandwidth	
	Selectable Motor Control Vector Control: 700S Phase II Control:	 Sensorless Vector with full tuning. Standard V/Hz with full custom capability and Vector Control with Force Technology (with and without feedback). Vector Control with Force Technology (with and without feedback), V/Hz Control, and permanent magnet motor control.	

Category	Specification		
		Frame 2	Frame 3A/3B
Control (continued)	Stop Modes Vector Control: 700S Ph. II Control:	 Multiple programmable stop modes including Ramp, Coast, DC-Brake, Ramp-to-Hold, and S-curve. Multiple programmable stop modes including Ramp, Coast, and Current Limit.	
	Accel/Decel Vector Control: 700S Phase II Control:	 Two independently programmable accel and decel times. Each time may be programmed from 0-3600 seconds in 0.1 second increments. Independently programmable accel and decel times, adjustable from 0-6553.5 seconds in 0.01 second increments.	
	Intermittent Overload:	110% Overload capability for up to 1 minute 150% Overload capability for up to 3 seconds	
	Current Limit Capability Vector Control: 700S Phase II Control:	 Proactive Current Limit programmable from 20 to 160% of rated output current. Independently programmable proportional and integral gain. Independent Motoring and Regenerative Power Limits programmable to 800% of rated output current.	
	Electronic Motor Overload Protection:	Class 10 protection with speed sensitive response. Investigated by U.L. to comply with N.E.C. Article 430. U.L. File E59272, volume 12.	
Encoder (Vector Control only)	Type:	Incremental, dual channel	
	Supply:	12V or 5V, 250 mA. 12V or 5V, 10 mA minimum inputs isolated with differential transmitter, 250 kHz maximum.	
	Quadrature:	90°, ± 27° at 25°C	
	Duty Cycle:	50%, ± 10%	
	Requirements:	Encoders must be line driver type, quadrature (dual channel) or pulse (single channel), 8-15V DC output (3.5-6V DC for 5V encoder), single-ended or differential, and capable of supplying a minimum of 10 mA per channel. Maximum input frequency is 250 kHz. The Encoder Interface Board accepts 12V DC or 5V DC square-wave with a minimum high state of 7.0V DC (12 volt encoder) or 3.1V DC (5 volt encoder). Maximum low state voltage is 0.4V DC.	
Feedback (700S Phase II Control only)	Encoder Input: Encoder Voltage Supply: Maximum Input Freq:	Dual Channel Plus Marker, Isolated with differential transmitter Output (Line Drive) Incremental, Dual Channel Quadrature type 5V DC or 12V DC (5V DC requires an external power supply), 320 mA/channel 400 kHz	
	Stegmann Hi-Resolution Option Encoder Voltage Supply: Hi-Resolution Feedback: Maximum Cable Length: RS-485 Interface: Customer-I/O Plug (P1) - Hi Res:	 11.5V DC @ 130 mA Sine/Cosine 1V P-P Offset 2.5 182 m (600 ft.) Hi-Resolution Feedback Option card obtains the following information via the Hiperface RS-485 interface shortly after power-up: Address, Command Number, Mode, Number of Turns, Number of Sine/Cos cycles, and Checksum. Allen-Bradley PN: S94262912 Weidmuller PN: BL3.50/90/12BK	
	Resolver Option Excitation Frequency: Excitation Voltage: Operating Freq. Range: Resolver Fdbk. Voltage: Maximum Cable Length:	 2400 Hz 4.25-26 Vrms 1-10 kHz 2V ±300mV 304.8 m (1000 ft.)	
DriveLogix (700S Phase II Control only)	User Available Memory Base:	1.5 megabytes	
	Battery:	1756-BA1 (Allen-Bradley P/N 94194801) 0.59g lithium	
	Serial Cable:	1761-CBLPM02 to 1761-NET-AIC 1761-CBLPA00 to 1761-NET-AIC 1756-CP3 directly to controller 1747-CP3 directly to controller Category 3 (2)	
	Compact I/O Connection:	Up to (30) modules	
	Cable:	20D-DL2-CL3 20D-DL2-CR3	

Derating Guidelines

Altitude

Above 1000 m (3280 ft.), derate the output current by 1% for every 100 additional meters (328 additional feet). This is applicable to filters and power modules. PowerFlex 700L 600/690V drives should not be used above 2000 m (6562 ft.) due to voltage spacing requirements.

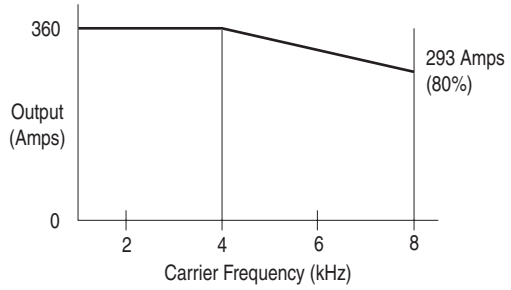
Ambient

Frame 2 drives have a maximum ambient of 50°C (122°F). Frame 3A and 3B drives have a maximum ambient of 40°C (104°F). PowerFlex 700L drives cannot be derated to operate at higher ambients.

Carrier Frequency

For Frame 2 drives, refer to the carrier frequency derating table below. PowerFlex 700L Frame 3A and 3B drives cannot be run above 4 kHz.

PowerFlex 700L Frame 2 Drive
Carrier Frequency Derating



Watts Loss (@ Rated Load, Speed, and PWM Carrier Frequency)

Frame Size	Voltage	PWM Freq.	Watts Loss					
			Filter Section	Power Section			Complete Drive	
			Into Air	Into Air	Into Liquid	Total	Total Air	Total Liquid
2	400V	4 kHz	Not Applicable				1500	7900
	480V	4 kHz	Not Applicable				1500	7900
3A	400V	4 kHz	4000	1000	10,500	11,500	5000	10,500
	480V	4 kHz	4000	1000	11,500	12,500	5000	11,500
	600V	4 kHz	4000	1200	10,500	11,700	5200	10,500
	690V	4 kHz	4000	1200	12,000	13,200	5200	12,000
3B (1)	400V	4 kHz	7800	2000	21,000	23,000	9800	21,000
	480V	4 kHz	7800	2000	23,000	25,000	9800	23,000
	600V	4 kHz	7800	2400	21,000	23,400	10,200	21,000
	690V	4 kHz	7800	2400	24,000	26,400	10,200	24,000

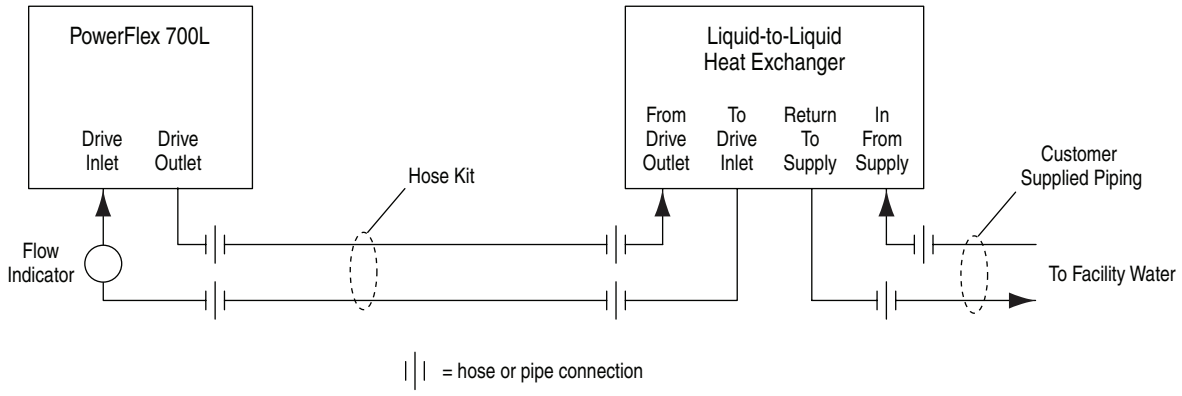
(1) Frame 3B power section consists of two (2) power modules. Each module dissipates half (½) of the watts shown in this table.

Cooling Loop Options

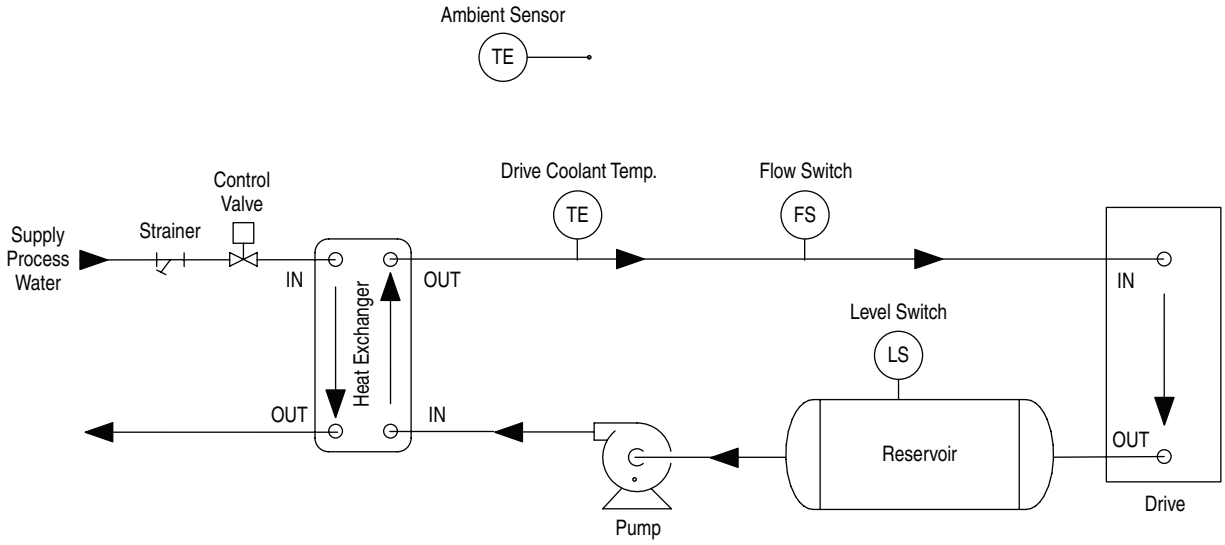
This section provides information about the various types of cooling loops.

Liquid-to-Liquid Heat Exchanger

The liquid-to-liquid heat exchanger utilizes a heat transfer plate to transfer heat from one liquid to another. This method requires a stable water supply from the user.



The drawing below shows a cooling loop diagram for a typical liquid-to-liquid heat exchanger.

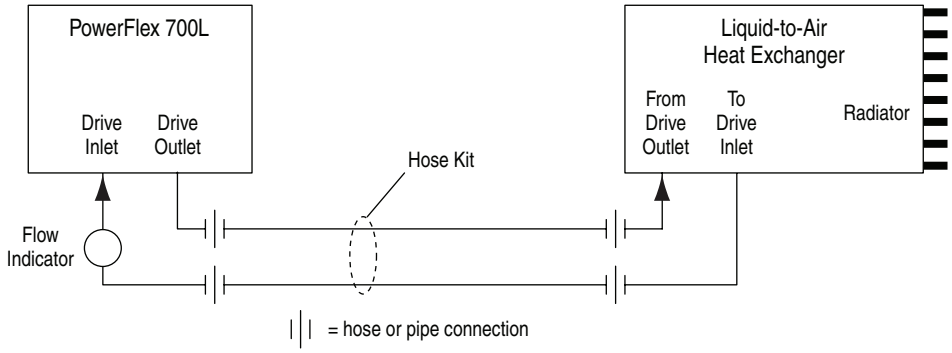


The main components of the liquid-to-liquid heat exchanger cooling loop include:

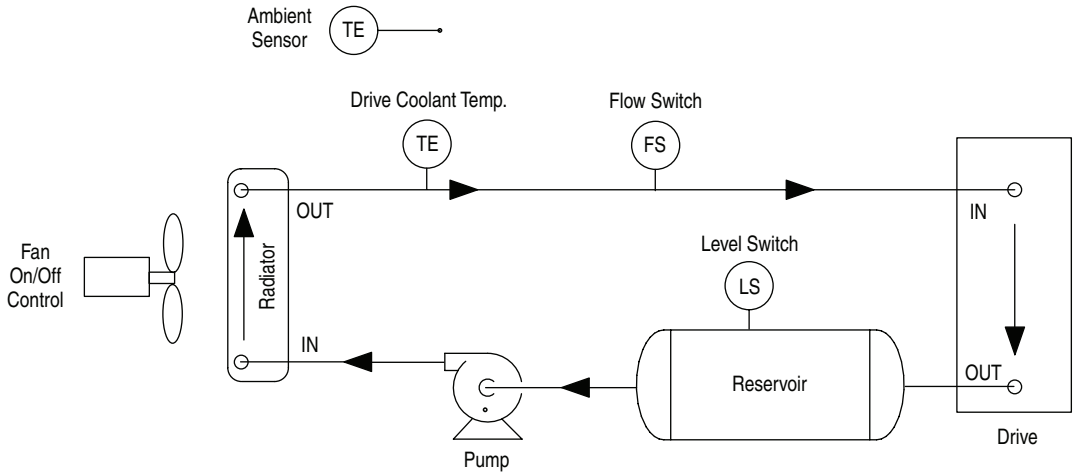
Part	Description
Strainer	Filters particles from the supply water.
Control Valve	Controls the supply loop water flow.
Heat Exchanger Plate	Transfers heat from the drive loop to the supply loop.
Ambient Sensor	Senses the ambient temperature used for the dew point control.
Drive Coolant Temperature Sensor	Senses the drive coolant temperature used for the dew point control.
Drive Coolant Flow Switch	Measures the drive coolant flow rate.
Level Switch	Senses the level of coolant in the reservoir.
Reservoir	Stores drive coolant.
Pump and Motor	Circulates drive coolant.

Liquid-to-Air Heat Exchanger

The liquid-to-air heat exchanger utilizes radiator technology to transfer heat from a liquid to surrounding air. This is a simple closed loop system — it does not require a water supply from the user. However, this system requires surrounding air 5 to 10°C below the maximum operating temperature of the drive.



The drawing below shows a cooling loop diagram for a typical liquid-to-air heat exchanger.

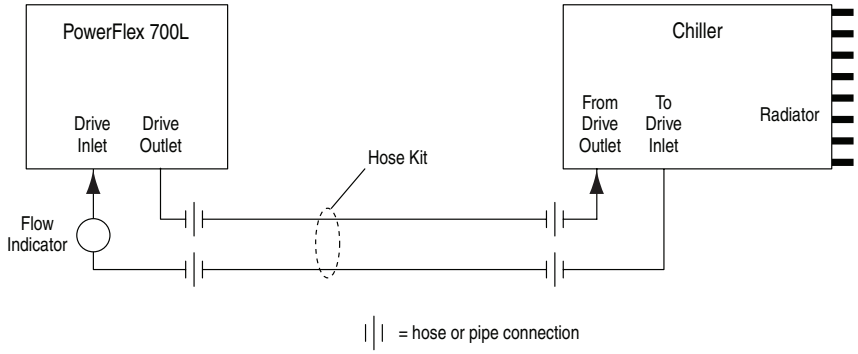


The main components of the liquid-to-air heat exchanger cooling loop include:

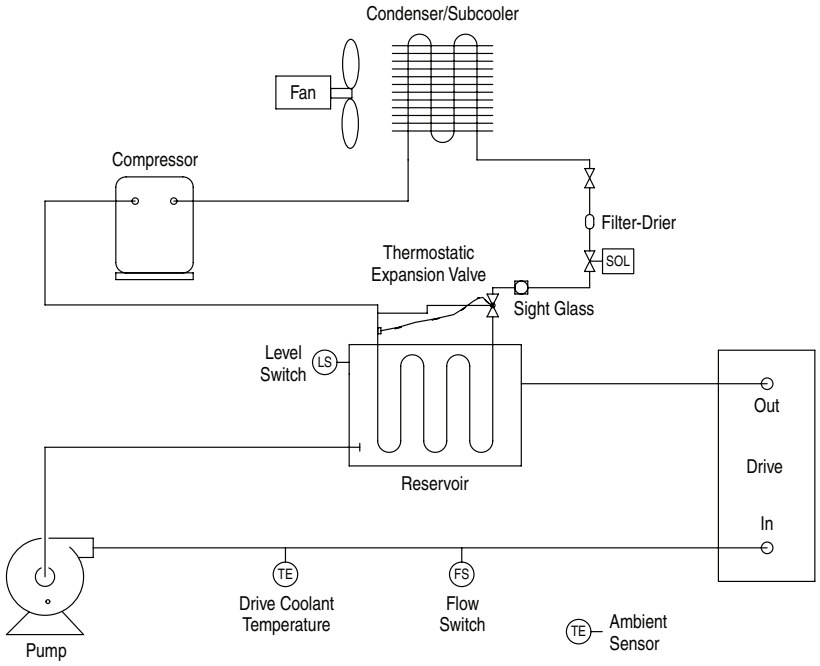
Part	Description
Fan	Blows air across the radiator.
Radiator	Transfers heat from liquid to air.
Ambient Sensor	Senses the ambient temperature used for the dew point control.
Drive Coolant Temperature Sensor	Senses the drive coolant temperature used for the dew point control.
Drive Coolant Flow Switch	Measures the drive coolant flow rate.
Level Switch	Senses the level of coolant in the reservoir.
Reservoir	Allows for expansion of coolant.
Pump and Motor	Circulates drive coolant.

Chiller

The chiller utilizes refrigerant to transfer heat from a liquid to air. This is a simple closed loop system — it does not require a water supply from the user. A chiller can achieve almost any coolant temperature required. Coolant temperature should be at or above ambient temperature to avoid condensation on drive components.



The drawing below shows a cooling loop diagram for a typical chiller.



The main components of the chiller cooling loop include:

Part	Description
Compressor	Forces the refrigerant into a smaller space.
Fan	Blows air across the condenser/subcooler.
Condenser/Subcooler	Cools the refrigerant.
Filter-Drier	Filters the refrigerant.
Sight Glass	Allows viewing of the level of drive coolant in the reservoir.
Thermostatic Expansion Valve	Allows for expansion of the refrigerant.
Level Switch	Senses the level of coolant in the reservoir.
Reservoir	Allows for expansion of coolant.
Pump and Motor	Circulates drive coolant.
Drive Coolant Temperature Sensor	Senses the drive coolant temperature used for the dew point control.
Drive Coolant Flow Switch	Measures the drive coolant flow rate.
Ambient Sensor	Senses the ambient temperature used for the dew point control.

Recommended Cooling Loops

Liquid-to-Liquid Heat Exchanger Selection

Drive Frame Size	Supply Loop Requirements (1)			Liquid-to-Liquid Heat Exchanger Cat. No. (3)
	Minimum Flow @ Pressure (2)	Maximum Pressure	Temperature Range	
2	15.1 LPM @ 0.83 bar (4 GPM @ 12 PSI)	8.62 bar (125 PSI)	0-40°C (32-104°F)	20L-LL13K-P75A
3A	22.7 LPM @ 0.83 bar (6 GPM @ 12 PSI)	8.62 bar (125 PSI)	0-35°C (32-95°F)	20L-LL13K-P75A
3B	56.8 LPM @ 0.83 bar (15 GPM @ 12 PSI)	8.62 bar (125 PSi)	0-35°C (32-95°F)	20L-LL24K-1P0A

(1) Supply loop requirements are for the input to the heat exchanger. These are not requirements for the drive. The output of the heat exchanger is designed to meet the flow and pressure requirements of the drive. For the flow and pressure requirements of the drive, see the table on page 46.

(2) The minimum pressure applies to the pressure drop across the heat exchanger and does not take into account additional pressure drop in the system such as piping or hosing.

(3) Recommended cooling loops shown are based on a single drive per cooling loop. Consult the factory for use of multiple drives on one cooling loop.

Estimated Amount of Coolant for the Drive Loop

Drive Frame Size	Estimated Amount of Coolant (1)
2	15.1 liters (4 gal.)
3A	19 liters (5 gal.)
3B	19 liters (5 gal.)

(1) The estimated amount of coolant is based on the heat exchanger using 1.2 m (4 ft.) hoses. Longer hoses require more coolant. The maximum hose length of 9.1 m (30 ft.) would require up to an additional 2.8 liters (3/4 gal.).

Hose Kits

Hose Length	Hoses per Kit	Drive Side(1) Coupling Size	Heat Exchanger Side Coupling Size	Used With	Hose Kit (2) Cat. No.
3 m (10 ft.)	2	0.75 inch	0.75 inch	Frame 2 and 13 kW heat exchanger	20L-GH10-B1
9.1 m (30 ft.)	2	0.75 inch	0.75 inch	Frame 2 and 13 kW heat exchanger	20L-GH30-B1
3 m (10 ft.)	2	1 inch	1 inch with 90° elbow	Frame 3A and 13 kW heat exchanger	20L-GH10-A2
9.1 m (30 ft.)	2	1 inch	1 inch with 90° elbow	Frame 3A and 13 kW heat exchanger	20L-GH30-A2
3 m (10 ft.)	2	1 inch	1 inch	Frame 3B and 24 kW heat exchanger	20L-GH10-A1
9.1 m (30 ft.)	2	1 inch	1 inch	Frame 3B and 24 kW heat exchanger	20L-GH30-A1

(1) All drive side hose kit fittings are 37 degree flare.

(2) Each hose kit contains two (2) hoses and the appropriate connectors.

When a chiller or liquid-to-air heat exchanger is preferred, we recommend consulting with a cooling loop supplier such as Dimplex Thermal Solutions. The following are recommended chillers.

Recommended Chillers (from Dimplex Thermal Solutions)

Drive Frame Size	Capacity	Flow Rate	Pressure	Reservoir Size	Piping (Inlet and Outlet)	Chiller Model (1)
2 and 3A	16,983 watts	94.6 LPM (25 GPM)	3.44 bar (50 PSI)	117.3 L (31 gal)	1-1/4 in. NPT	KV5000
3B	28,110 watts	151.4 LPM (40 GPM)	3.44 bar (50 PSI)	181.7 L (48 gal)	1-1/4 in. NPT	KV7500

(1) Each chiller is designed for single drive cooling for indoor installation only. For applications requiring multiple drives using one chiller or outdoor use, contact Dimplex Thermal Solutions.

Chiller Specifications

Chiller Model	Electrical Line Input (1)	Rated Load	Dimensions	Weight
KV5000	230V, 3 phase, 60 Hz	29 Amp	1067 mm L x 711 mm W x 1676 mm H (42 in. L x 28 in. W x 66 in. H)	249.5 kg (550 lbs.)
	460V, 3 phase, 60 Hz	17 Amp		
KV7500	230V, 3 phase, 60 Hz	40 Amp	1270 mm L x 914 mm W x 1676 mm H (50 in. L x 36 in. W x 66 in. H)	340 kg (750 lbs.)
	460V, 3 phase, 60 Hz	22 Amp		

(1) Desired Line Voltage must be specified upon ordering.

For chiller pricing/ordering, contact Dimplex Thermal Solutions:
USA and Canada: 1-800-968-5665
Elsewhere: 1-269-349-6800

Drive Coolant Requirements

Recommended Coolants

The table below lists approved sources and recommended coolants with appropriate corrosion inhibitors for the drive loop:

Source	Coolant
Interstate Chemical http://www.interstatechemical.com/contact.htm	NFP-50 (1); a 50/50 premix of propylene glycol and distilled water NFE-50 (1); a 50/50 premix of ethylene glycol and distilled water
Koolant Koolers/Dimplex Thermal Solutions http://www.koolantkoolers.com/index.php/nic=contact	K-Kool-E (1); ethylene glycol (available premixed with distilled water) Propylene glycol (1) also available
Dow Chemical http://www.dow.com	Dowtherm® SR-1 (2); ethylene glycol Dowfrost® (2); propylene glycol Dowtherm and Dowfrost are registered trademarks of the Dow Chemical Company

(1) Available in 5 gallon pails.

(2) Not premixed with distilled water, and may not be available in 5 gallon quantities.

Non-premixed coolants require a coolant-to-water mix ratio of 50% by volume.

Important: Since coolant performance slowly degrades over time, the drive loop coolant should be replaced every two years and/or whenever the loop is drained for servicing.

Corrosion Inhibitor

If an approved coolant is not used, the drive coolant must consist of clean water *with a corrosion inhibitor.* An approved corrosion inhibitor is Chemtool, Inc. (www.chemtool.com) part number Watertool 4435-C. The recommended concentration of the inhibitor is 8-10% by volume. Deionized water is prohibited. Use distilled water or water with less than 50 ppm concentrations of:

- Sulfate and chloride
- Hard water ions such as Mg++ and Ca++

Ethylene and propylene glycols must be inhibited and silicate free. **Use of common silicate-containing, automotive-type ethylene glycol solutions is prohibited as they may damage the heat exchanger and/or drive and cooling module equipment.**

The drive coolant must be compatible with the following materials:

- Copper
- Brass
- Aluminum
- Arimid fiber gasket with nitrile binder (Garlock, Inc. Blue-Gard 3000®)

  Blue-Gard 3000 is a registered trademark of Garlock, Inc.
- Synthetic rubber hose (Parker Hannifan Corp 801 General Purpose Hose)
- Viton seal (Complete Drive only)

Biocide

A biocide may be needed to control biological growth. Use of a biocide is permitted. For specific recommendations, consult a reputable water treatment company.

Coolant Requirements for One Frame 2, 3A or 3B Drive

Drive Frame Size	Coolant Temperature Range	Minimum Coolant Flow Rate	Pressure Drop (2) From Drive Inlet to Drive Outlet at Minimum Coolant Flow Rate	Coolant Type
2	0-50°C (32-122°F)	30.3 LPM (8 GPM)	1.58 bar (23 PSI)	WEG50 (3) or WPG50 (4)
3A	0-40°C (32-104°F)	30.3 LPM (8 GPM)	0.35 bar (5 PSI)	
3B	0-40°C (32-104°F)	56.8 LPM (15 GPM) (1)	0.48 bar (7 PSI) (1)	

(1) Frame 3B includes separate converter and inverter power modules. A single inverter or converter power module requires a minimum flow rate of 30.3 LPM (8 GPM) at 0.35 bar (5 PSI).

(2) Pressure drop does not include any system connections such as hoses or piping. Cooling systems must be sized to provide minimum flow considering entire system pressure drop.

(3) WEG50 equals good quality or distilled water with approved *inhibited** ethylene glycol, 50% glycol by volume.

(4) WPG50 equals good quality or distilled water with approved *inhibited** propylene glycol, 50% glycol by volume.

* Inhibited ethylene glycol or propylene glycol must contain a corrosion inhibitor. See Corrosion Inhibitor on page 45 for an approved source.

Cooling Loop Application Guidelines

Do not use ferrous and plated-ferrous materials for pipe-treated water to the power modules and drive. Use of ferrous materials will degrade the performance of the power module chillplate.

Use the following guidelines for applying cooling loops other than those recommended.

- The allowable drive coolant temperature range is:
  - Frame 2 Drive: 0°C to 50°C (32°F to 122°F)
  - Frame 3A/3B Drive: 0°C to 40°C (32°F to 105°F)

  When using coolant at a temperature below the dew point of the surrounding air, condensation could accumulate on the drive heatsink and/or circuit boards and damage the drive. In this situation, install a coolant flow regulating device and tube/hose insulation. A flow regulating device modulates the coolant flow rate to a level that permits the drive heatsink temperature to rise above the dew point. Insulation for customer side tube or hose may be closed-cell foam insulation with minimum 12.7 mm (0.50 in.) wall thickness.
- The cooling loop should include a flow switch on the connection to the drive inlet to turn off the drive if coolant flow drops below the minimum flow required by the drive (see table above).
- Circulate coolant through the drive only when the drive is also powered. Failure to do this may result in condensation accumulating on the drive heatsink and/or circuit boards, which could damage the drive.
- An interlock from the cooling loop should be used to stop the drive when the cooling loop is faulted.
- For applications requiring a closed loop coolant system, ensure the system is vented to remove air that would otherwise degrade the performance of the drive heatsink.
- Install a flow measuring device at the inlet of each Converter and each Inverter Power Module. Note that flow measuring devices are included in the PF700L Frame 3A/3B Complete Drive cabinets (13th position in catalog number = A). The coolant flow rate (GPM) must meet the requirements in the table above.
- The following types of pipe are recommended for cooling loop connections:
  - Copper tubing, type L
  - Brass pipe
  - Stainless steel, 300 series

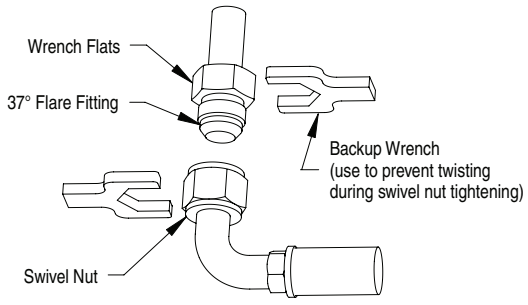
  Important: Do not use galvanized pipe.
- The cooling loop should have a method for draining and replacing the coolant.

Drive Coolant Connections

Frame 2 Drive

Coolant connections for a Frame 2 drive are made using 37 degree flare fittings which have a:

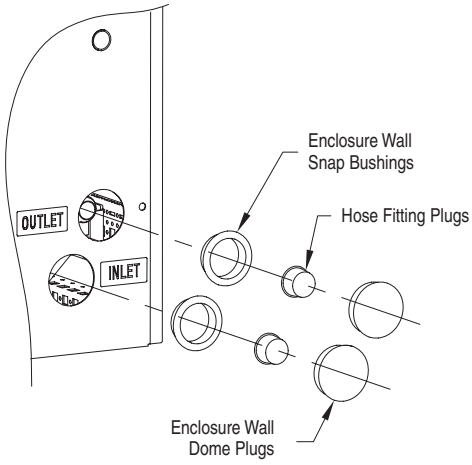
- 3/4-inch nominal size
- "-12" SAE dash size
- 1 1/16-12 UN/UNF-2B external thread size

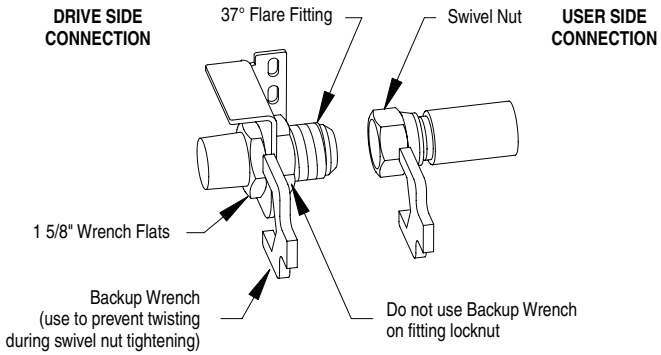


Frame 3A/3B Complete Drive

Frame 3A/3B Complete Drive coolant connections are made using 37 degree flare fittings which have a:

- 1-inch nominal size
- "-16" SAE dash size
- 1 5/16-12 UN/UNF-2B external thread size





PowerFlex, Force Technology, DriveGuard, RSLogix, DriveExplorer, DriveTools SP, and DPI are trademarks of Rockwell Automation.
Trademarks not belonging to Rockwell Automation are property of their respective companies.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 20L-TD001A-EN-P – August, 2008

Copyright © 2008 Rockwell Automation, Inc. All rights reserved. Printed in USA.